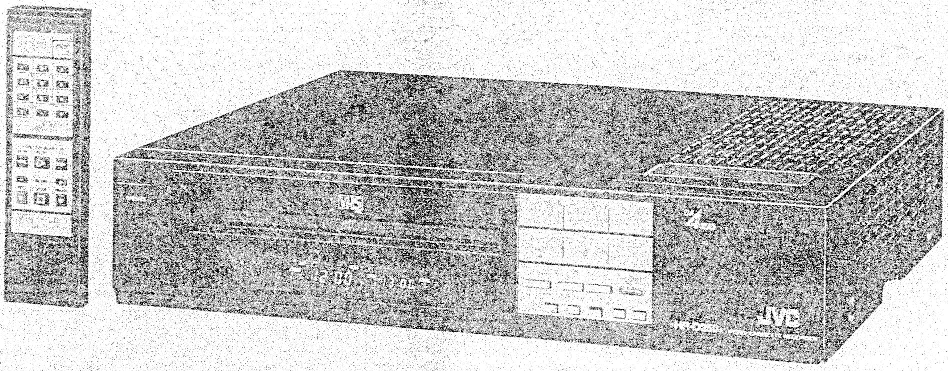
JVC

SERVICE MANUAL

COLOUR VIDEO CASSETTE RECORDER VHS PAL

HR-D250E/EG/EK



SPECIFICATIONS

Format	VHS PAL standard
Recording system	Rotary, slant azimuth two-head helical scan system
Video signal system	PAL colour and CCIR monochrome signals, 625 lines
Tape width	12.65 mm
Playing time	240 minutes with E-240 video cassette
Temperature	
Operating	5°C to 40°C
Storage	-20°C to 60°C
Channel coverage	VHF BAND I, 47 — 111 MHz VHF BAND III, 111 — 300 MHz UHF BAND IV/V, 470 — 862 MHz
Aerial output	UHF channels 32 — 40 (adjustable)
Power consumption	30 watts (50 watts with camera)
Power requirement	220 V∿, 50/60 Hz
Video	
Input	0.5 to 2.0 Vp-p, 75 ohms unbalanced
Output	1.0 Vp-p, 75 ohms unbalanced
Signal-to-noise ratio	43 dB (Rohde & Schwarz noise meter) with PICTURE SHARPNESS control at centre position
Horizontal resolution	More than 250 lines with PICTURE SHARPNESS control at centre position
Audio	
Input	Line: -20 dBs 50 k-ohms unbalanced
Output level	-6 dBs, high impedance load
Output impedance	Less than 1 k-ohm, unbalanced
Signal-to-noise ratio	More than 40 dB
Frequency range	70 Hz to 10,000 Hz
Timer	14-day/4-programme timer
Dimensions	435 mm(W) x 95 mm(H) x 376 mm(D)
Weight	7.6 kg
Provided accessories	Aerial cable, Video cassette tape, Infrared remote control unit, "R6" battery x 2

Design and specifications subject to change without notice.

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Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▨) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors

5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

7. Check that replaced wires do not contact sharp edged or pointed parts.

8. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

9. Also check areas surrounding repaired locations.

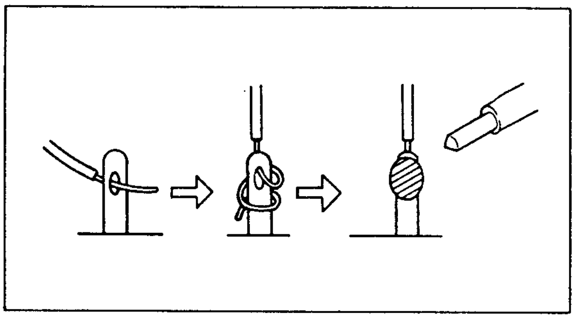

Fig. 1

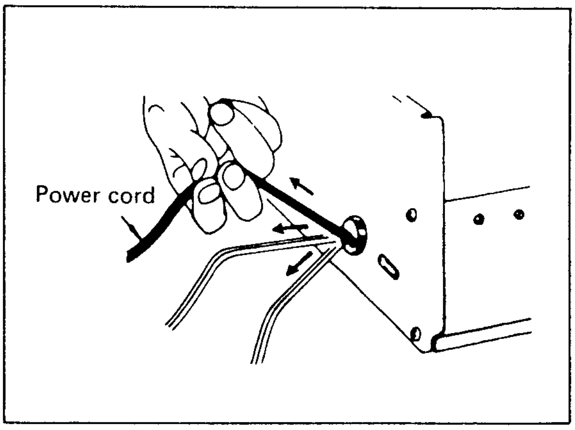

Fig. 2

10. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the parts specified. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

11. Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1. Connector part number : E03830-001
2. Required tool : Connector crimping tool of the proper type which will not damage insulated parts.
3. Replacement procedure
   1) Remove the old connector by cutting the wires at a point close to the connector.
   Important : Do not reuse a connector (discard it).
   2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
   3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
   4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.
   5) Check the four points noted in Fig. 7.

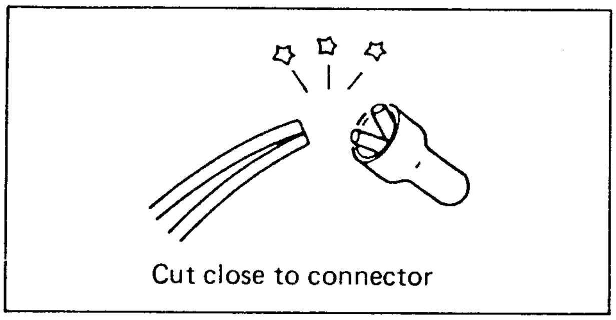
Cut close to connector

Fig. 3

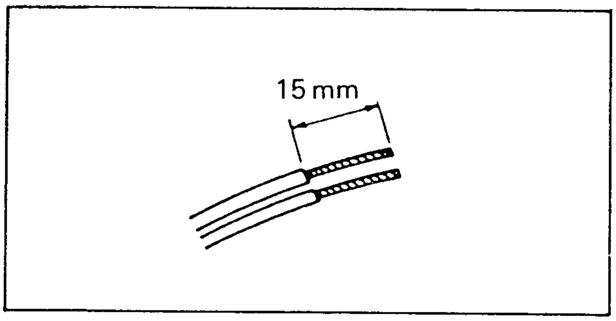

Fig. 4

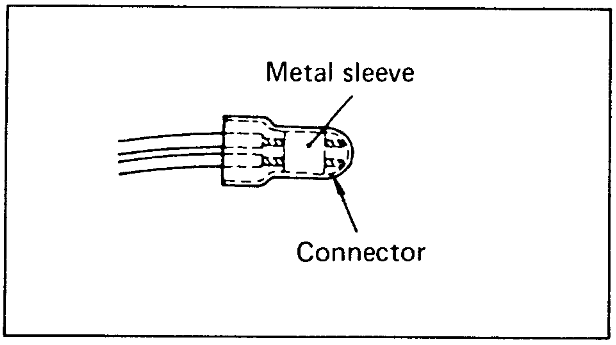
Metal sleeve
Connector

Fig. 5

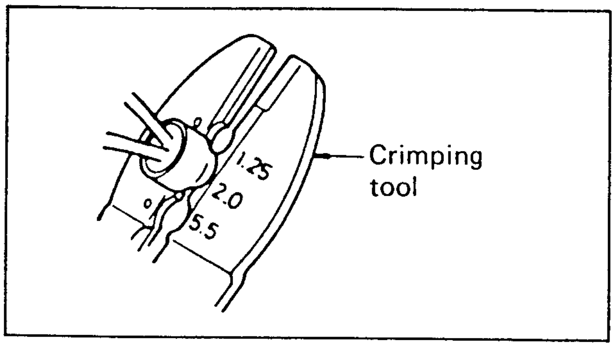
1.25
2.0
5.5
Crimping tool

Fig. 6

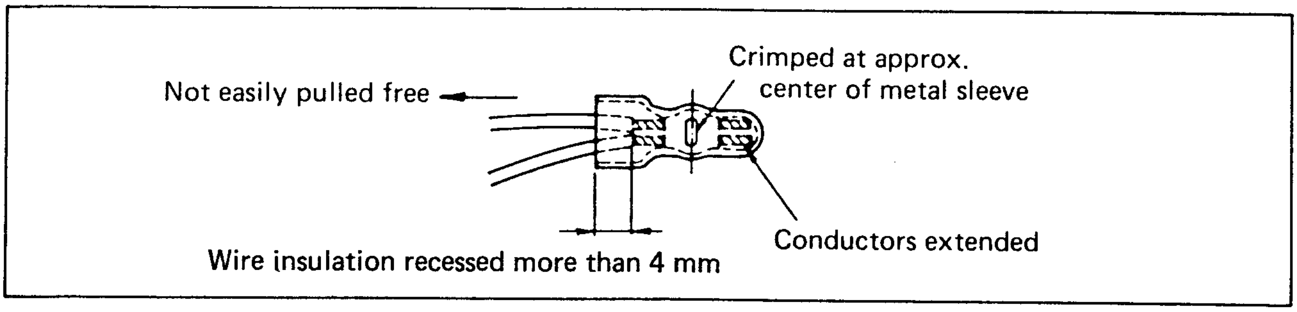
Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.
2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.) See table below.
3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d),(d') between soldered terminals, and between terminals and surrounding metallic parts. See table below.

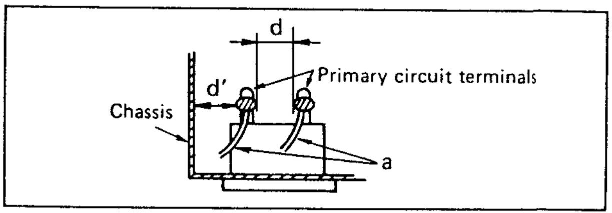

Fig. 8

Table 1: Ratings for selected areas

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance(d),(d')
100 V	Japan	≧ 1 MΩ/500 V DC	1 kV 1 minute	≧ 3 mm
110 to 130 V	USA & Canada	– – –	900 V 1 minute	≧ 3.2 mm
* 110 to 130 V 200 to 240 V	Europe Australia	≧ 10 MΩ/500 V DC	4 kV 1 minute	≧ 6 mm (d) ≧ 8 mm (d') (a: Power cord)

* Class Π model only.

Note. This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

4. **Leakage current test**
   Confirm specified or lower leakage current between B(earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method: (Power ON)
Insert load Z between B(earth ground,power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure and following table.

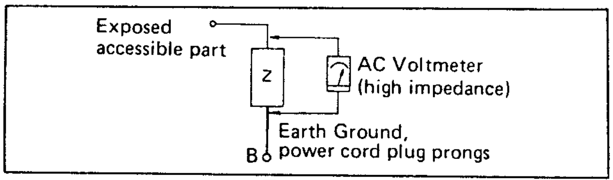
Exposed accessible part
Z
AC Voltmeter (high impedance)
Earth Ground, power cord plug prongs
B

Fig. 9

Table 2: Leakage current ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (B) to:
100 V	Japan	1 kΩ	i ≦ 1m A rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 µF 1.5 kΩ	i ≦ 0.5m A rms	Exposed accessible parts
110 to 130 V 200 to 240 V	Europe Australia	2 kΩ	i ≦ 0.7 m A peak i ≦ 2 m A dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 m A peak i ≦ 2 m A dc	Other terminals

Note. This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

HR-D250E/EG/EK

INSTRUCTIONS

For reference, the text of the instruction booklet of this model is reproduced in the following pages.
Numbering of the pages also corresponds with that of the booklet.

Thank you for purchasing the JVC HR-D250E Video Cassette Recorder. Before use, read this instruction booklet carefully for obtaining the best results from your new unit.

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SAFETY PRECAUTIONS

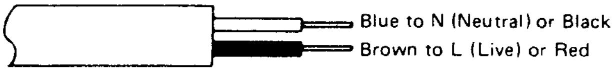
The rating plate and the safety caution are on the rear of the unit.

WARNING – DANGEROUS VOLTAGE INSIDE
WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

IMPORTANT (In the United Kingdom)
Mains Supply (240 V∿, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:



If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black.
Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.

Note
We recommend that you should disconnect the AC cord from the outlet.

FOR YOUR SAFETY (in Australia)
Install any external aerial to AS 1417.1

Omkopplaren OPERATE på denna apparat är sekundärt kopplad och skiljer inte apparaten från nätet i läge OPERATE OFF.

The OPERATE button does not completely shut off mains power from the unit, but switches operating current on and off.

BEMAERK: I stilling OFF er apparatet stadig forbundet med lysnettet Hvis det ønskes fuldstaendig afbrudt skai netledningen traekkes ud.

CAUTION

- Disconnect the mains plug from the supply socket when not in use.
- When you are not using the HR-D250E for a long period of time, it is recommended that you disconnect the power cord from the AC outlet.
- Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial.

VHS
PAL

Only cassettes marked "VHS" can be used with this video cassette recorder.

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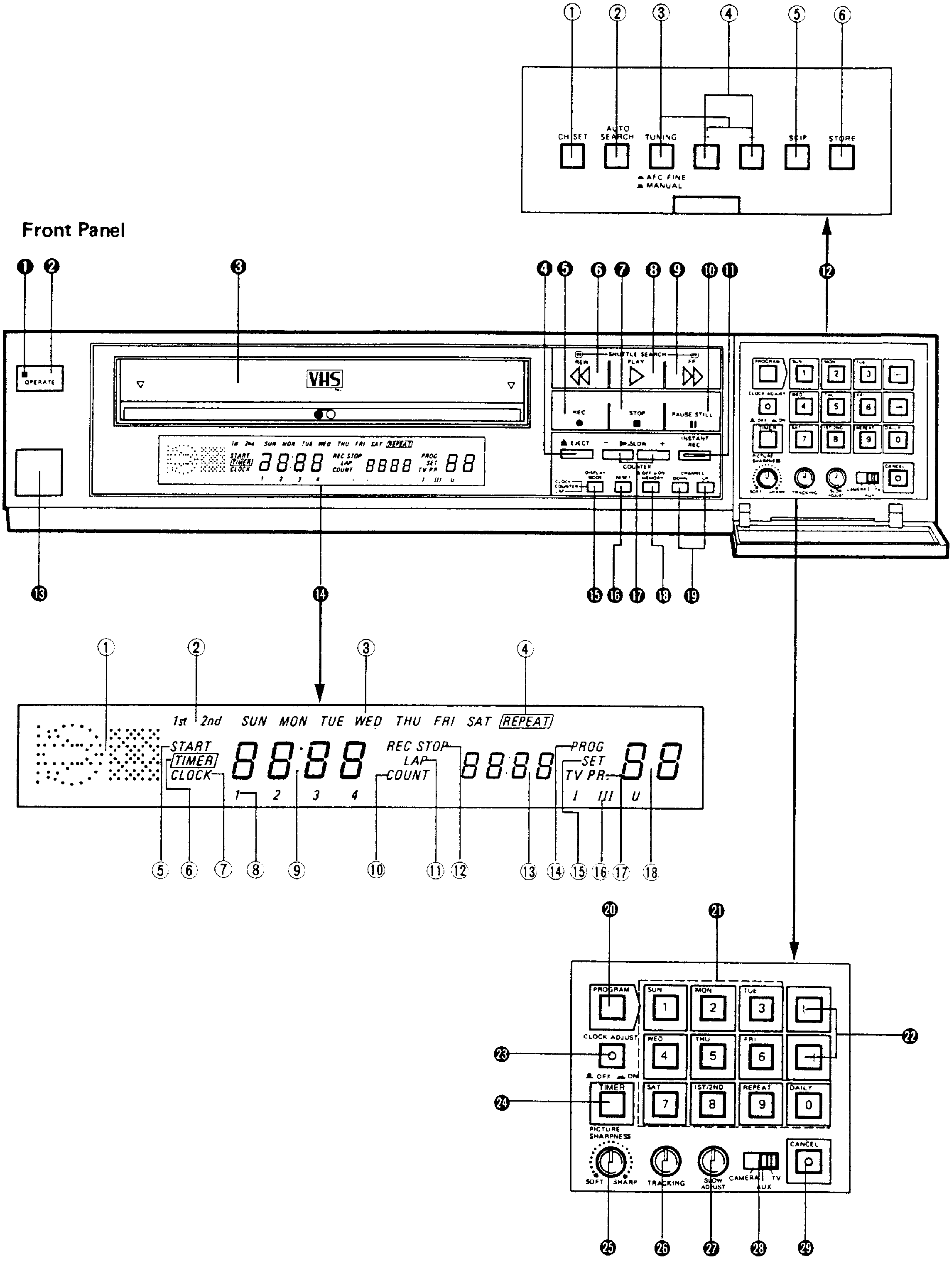
CONTROLS, INDICATORS AND CONNECTORS

Keep this page opened so that you can refer to it at any time when you are reading this booklet.

Pre-tuning section

Front Panel


① ② ③ ④ ⑤ ⑥
CH SET
AUTO SEARCH
TUNING
SKIP
STORE
AFC FINE
MANUAL
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫ ⓬
OPERATE
VHS
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE STILL
EJECT
SLOW
INSTANT REC
COUNTER
DISPLAY MODE
RESET
MEMORY
OFF ON
CHANNEL
DOWN
UP
⓭ ⓮ ⓯ ⓰ ⓱ ⓲ ⓳
① ② ③ ④
1st 2nd SUN MON TUE WED THU FRI SAT REPEAT
START
TIMER
CLOCK
8888
REC STOP
LAP
COUNT
8888
PROG
SET
TV PR
88
1 2 3 4
I III U
⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱
⓴ ㉑ ㉒ ㉓ ㉔
PROGRAM
SUN 1
MON 2
TUE 3
CLOCK ADJUST
WED 4
THU 5
FRI 6
OFF ON
TIMER
SAT 7
1ST/2ND 8
REPEAT 9
DAILY 0
PICTURE SHARPNESS
SOFT SHARP
TRACKING
SLOW ADJUST
CAMERA TV AUX
CANCEL
㉕ ㉖ ㉗ ㉘ ㉙

❶ Power indicator
Lights when the OPERATE button ❷ is pressed.

❷ OPERATE button
Press to apply power to the recorder. The indicator will light. Loading a cassette also turns the power on.

❸ Cassette loading slot
Insert a VHS video cassette. The door will close and the symbol showing that a cassette is inside will appear.

❹ EJECT button

❺ Record button (REC)
Press together with the PLAY button ❽ for recording.

❻ REW/SHUTTLE SEARCH button
To rewind the tape, press this button while in the Stop mode. To view the speeded-up picture in the reverse direction for programme search, hold this button pressed while in the Play mode.

❼ STOP button
To stop the tape.

❽ PLAY button
Press to play back the tape or cancel the Pause/Still mode. Also, press this button together with the REC button ❺

❾ FF/SHUTTLE SEARCH button
To fast forward the tape, press this button while in the Stop mode. To view the speeded-up picture in the forward direction for programme search, hold this button pressed while in the Play mode.

❿ PAUSE/STILL button
Press to stop the tape temporarily to avoid recording of unwanted material. When this button is pressed during playback, a still picture will appear. The still picture can be advanced in a frame-by-frame manner each time this button is pressed.

⓫ INSTANT REC button
Use this button to start recording instantly and stop automatically after a predetermined time. (See page 22.)

⓬ Built-in tuner pre-tuning section
Open the compartment cover on top of the unit.

① **Channel set button (CH SET)**
Press this button for pre-tuning the built-in tuner to TV stations in your area. (See pages 11 and 12.)

② **Automatic tuning button (AUTO SEARCH)**
Press this button to initiate automatic sweep tuning, which stops automatically when a broadcast signal is detected.

③ **TUNING button**
AFC FINE (▬): To activate the built-in Automatic Frequency Control circuit. Also, in the AFC FINE position, the two controls to the right function as fine tuning controls.
MANUAL (▄): To use the two controls to the right as manual tuning controls.

④ **Fine/Manual tuning buttons (-, +)**
The function of these buttons differs depending on the setting of the TUNING button ③.
AFC FINE: To shift the AFC centre frequency for fine tuning; press "-" button to shift it in the direction of decreasing frequencies, and "+" in the direction of increasing frequencies.
MANUAL: To tune to weaker broadcast signals manually; press "-" button to search for channels of lower frequencies, and "+" for those of higher frequencies. Sweep tuning is performed only while the button is being pressed.

⑤ **SKIP button**
To skip unused channels.

⑥ **STORE button**
To store the tuned-in station in memory.

⓭ Infrared beam receiving window

⓮ Fluorescent display section

① **Symbolic mode indicator**
Illuminates to give quick, easy visual reference of the operating mode. Combinations of 5 different symbols indicate 9 operating modes:

PLAY:	▷	REWIND:	◁◁
STILL:	▯▯	FAST FORWARD:	▷▷
RECORD:	○	REVERSE SHUTTLE SEARCH:	▷ ◁◁
RECORD PAUSE:	○▯▯	FORWARD SHUTTLE SEARCH:	▷ ▷▷
SLOW:	▷▯▯		

② **Week indicator**
"1st" or "2nd" illuminates to show the week for making preset recordings. "1st" stands for the period within one week and "2nd" within the second week from setting.

③ **Day indicator**
Illuminates both for continuous day indication and for day presetting for future recordings.

④ **REPEAT indicator**
Shows that the entered data for timer recording will be retained for serial recordings. Can be turned on and off with the REPEAT button (numeric key [9]). Lights automatically when the DAILY button is pressed (numeric key [0]), but can be cancelled by pressing the REPEAT button.

⑤ **START indicator**
Illuminates for timer setting to designate the recording start time.

⑥ **TIMER indicator**
Illuminates when the TIMER button ㉔ is pressed to ON (▬) to show that the recorder has been properly preset for timer recording.

⑦ **CLOCK indicator**
Always illuminates except in the Timer Set mode.

⑧ **Programme number indicator**
Numerals 1 through 4 illuminate successively each time the PROGRAM button ⓴ is pressed to show which programme is ready for entry.

⑨ **Clock/Start time display**

⑩ **COUNT indicator**
Illuminates to show that the digits in the display to the right are the counter reading.

⑪ **LAP indicator**
Illuminates to show that the digits in the display to the right are the reading for the elapsed recording time.

⑫ REC STOP indicator
Flashes or illuminates in the Instant Recording mode. Only STOP illuminates for timer setting to designate the recording stop time.

⑬ Stop time/Elapsed time/Counter display/Sweep indicator

⑭ Programme indicator (PROG)
Illuminates for channel setting in the Timer Set mode.

⑮ SET indicator
Illuminates when the CH SET button (① of ⓬) in the top-panel pre-tuning section is pressed for pre-tuning and flashes during sweep scanning.

⑯ Band indicator

⑰ TV PR. indicator
Illuminates to show that the displayed channel is currently being received by the built-in tuner.

⑱ Channel display
Numerals 1 through 32 are successively displayed to show which channel is selected for recording, timer setting or for pre-tuning.

⓯ DISPLAY MODE select button
Press to change the display from the Timer Set mode to the Clock mode. Usually use this button to change the middle 4-digit display from tape counter (COUNT) to lap time display (LAP), or vice versa.

⓰ COUNTER RESET button
Press to reset the tape counter reading to "0000" and lap time reading to "0:00".

⓱ SLOW -/+ buttons
Press either button for slow-motion playback after engaging the Play mode. Pressing either button engages first the Slow mode at 1/40 normal speed. To increase the speed, press the "+" button the required number of times. (1/20, 1/10 and 1/6 are available.) To decrease the speed, press the "-" button.

⓲ COUNTER MEMORY button
When this button is pressed to ON (▬), the tape will stop automatically at the reading of about "0000" in the Rewind or Fast Forward mode.

⓳ CHANNEL UP/DOWN buttons
Press either button to scan to a desired preset station. The selected channel will be indicated in the channel display.

⓴ PROGRAM button
Press this button when you want to preset the timer for unattended recording. The entire display will change to the Timer Set mode, with numeral 1 illuminated at the bottom of the display. This shows that programme memory No. 1 is ready to accept entries. To change the programme number, press this button until the number of the programme memory you want to use illuminates. After programme number 4, the display returns to the Clock mode.

㉑ Dual-purpose numeric keys
These 10 keys can be used to set the day, time and channel in the Timer Set mode, and the day and clock time in the Clock Set mode. (Can also be used for regular channel selection.)
"1" also functions as Sunday button (SUN).
"2" also functions as Monday button (MON).
"3" also functions as Tuesday button (TUE).
"4" also functions as Wednesday button (WED).
"5" also functions as Thursday button (THU).
"6" also functions as Friday button (FRI).
"7" also functions as Saturday button (SAT).
"8" also functions as "1st/2nd-week" button (1ST/2ND).
"9" also functions as "REPEAT" button.
"0" also functions as "DAILY" button.

For channel selection (in all modes), the "0" key functions as follows: Pressing once gives channel 10, twice, channel 20 and three times, channel 30. The zero in the units place blinks. If any other numeric key is pressed while the zero is blinking, channels 11 – 19, 21 – 29 and 31, 32 are obtained. (Numbers larger than 33 will be rejected.) To obtain channels 10, 20 and 30, allow for about 4 seconds after pressing the "0" button; blinking of the zero in the units place will stop and the corresponding channel will be set.
For more details, refer to pages 13 and 19.

㉒ Cursor keys (⇤ ⇥)
⇤ moves the cursor back, and ⇥ advances the cursor. Use these keys to reach preprogrammed positions for correction. For more details, refer to pages 13 and 19.

㉓ CLOCK ADJUST button
To set or adjust the clock time, press this button and use the numeric keys. After time setting, press this button again to start timekeeping.

㉔ TIMER button
Press to ON (▬) after you have preset the timer for unattended recording.

㉕ PICTURE SHARPNESS control
Turn this knob clockwise to make the picture sharper. Turn counterclockwise to give the picture a softer tone. Effective only for playback pictures. (No effect for recording.)

㉖ TRACKING control
Use this control to minimise noise bars, if observed during normal-speed playback.

㉗ SLOW ADJUST control
Use this control to minimise noise bars, if observed, during slow-motion playback.

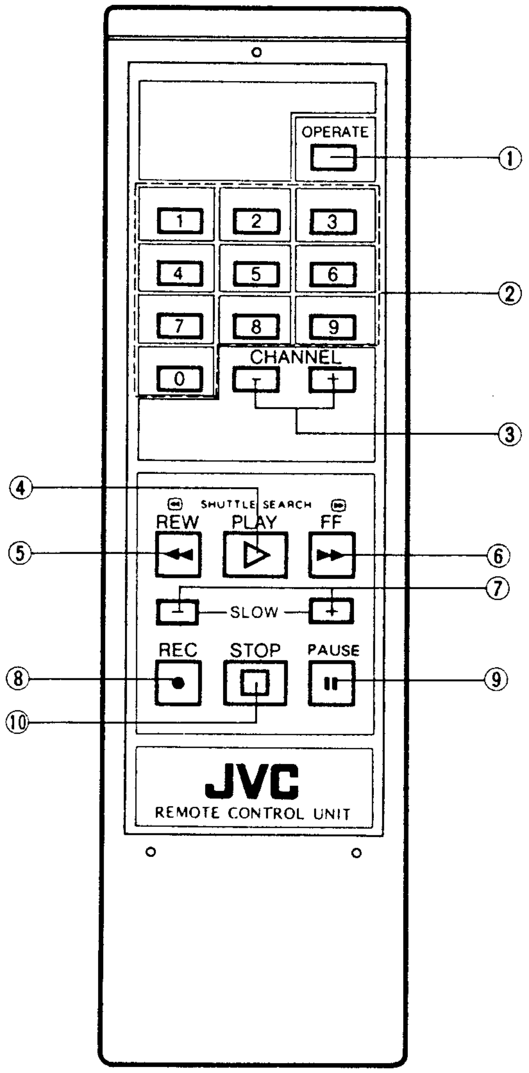
㉘ Input select switch (TV/AUX/CAMERA)
For selecting the recording input signal.

TV:	To record signals coming from the built-in tuner.
AUX:	To record signals coming from a unit connected to the rear panel VIDEO IN and AUDIO connectors.
CAMERA:	To record signals coming from a camera connected to the rear panel CAMERA connector.

㉙ CANCEL button
To cancel or "clear" the programmed data, press this button in the Timer Set mode.

Infrared remote control unit

The infrared remote control unit gives you full operation control from your viewing position. The maximum operating distance is about 8 m.



① **OPERATE button**
To switch power on or off for the recorder.

② **Numeric keys**
Key in the channel you wish to record.
To key in a two-digit channel number, press "0" once for 10, twice for 20 and three times for 30.
Example: To call up channel 16, first press "0" and then "6". "16" will be displayed in the channel display section of the recorder's fluorescent display.
To call up channel 10, 20 or 30, press "0" the number of times required and wait until the zero in the units place stops blinking.

③ **CHANNEL scan buttons (+, -)**
Use these buttons for sequential channel selection.

④ **PLAY button**

⑤ **REW/SHUTTLE SEARCH button**

⑥ **FF/SHUTTLE SEARCH button**

⑦ **SLOW -/+ buttons**

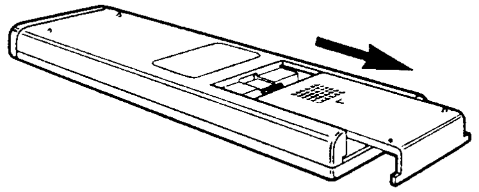
⑧ **REC button**

⑨ **PAUSE button**

⑩ **STOP button**

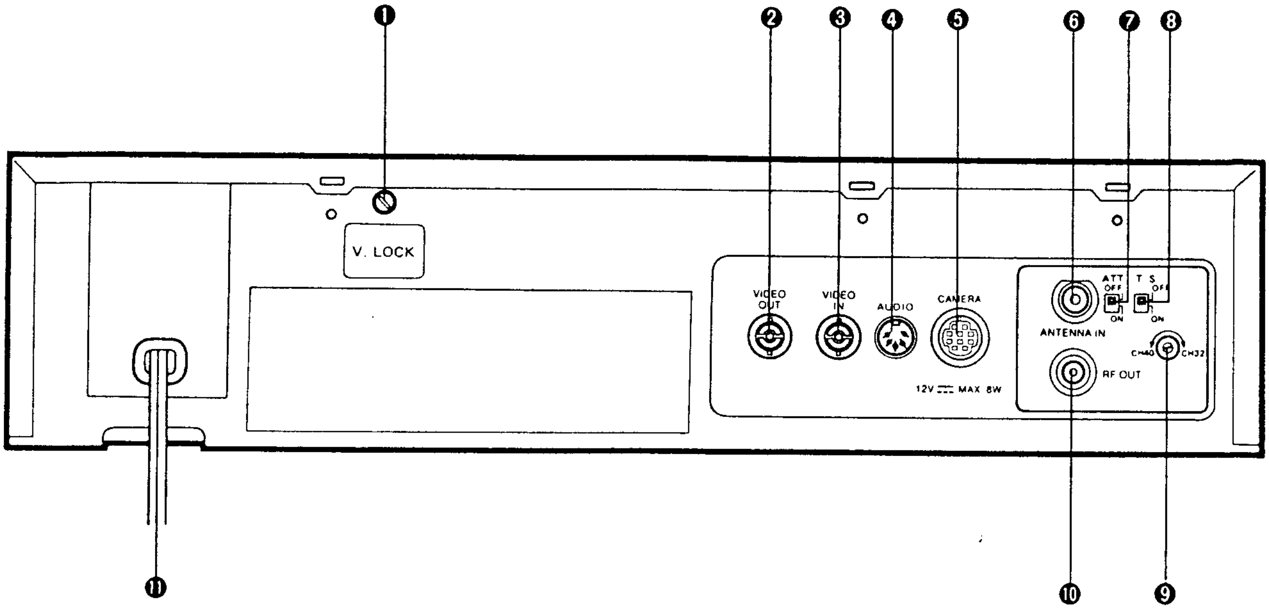
Installing the batteries

1. Slide the battery compartment cover on the rear of the unit in the direction of the arrow (►).



2. Insert 2 "R6"-size batteries (provided) in the correct directions into the battery compartment.
3. Replace the cover.

Rear Panel



① V-LOCK adjustment screw
When operating in the Still mode, adjust this screw to eliminate any vertical vibration of the picture. (For any inquiry about this adjustment, contact a JVC Service Dealer.)

② VIDEO OUT connector
Connect to the video input connector of another video recorder for tape-to-tape transfer, or the video input connector of a video monitor for playback.

③ VIDEO IN connector
Connect to the video output connector of another video recorder for tape-to-tape transfer.

④ AUDIO input/output DIN socket
Connect a tape recorder or other audio sources or connect the audio output of other video sources for recording. Also, audio signals being recorded or played back are available from the output terminals of this DIN socket.

⑤ CAMERA connector
Connect a JVC video camera (with a power consumption of less than 8 watts) directly to this connector using a 10-pin camera cable.

Caution: Other brands of cameras and some JVC cameras may not be electronically compatible, even though the same type of connector is used. Consult your dealer.

⑥ Aerial input connector (ANTENNA IN)
Connect an aerial to this connector.

⑦ Attenuator switch (ATT)
Set to OFF to receive broadcasts from distant stations. Set to ON to receive broadcasts of high field strength. Use a screwdriver for setting this switch.

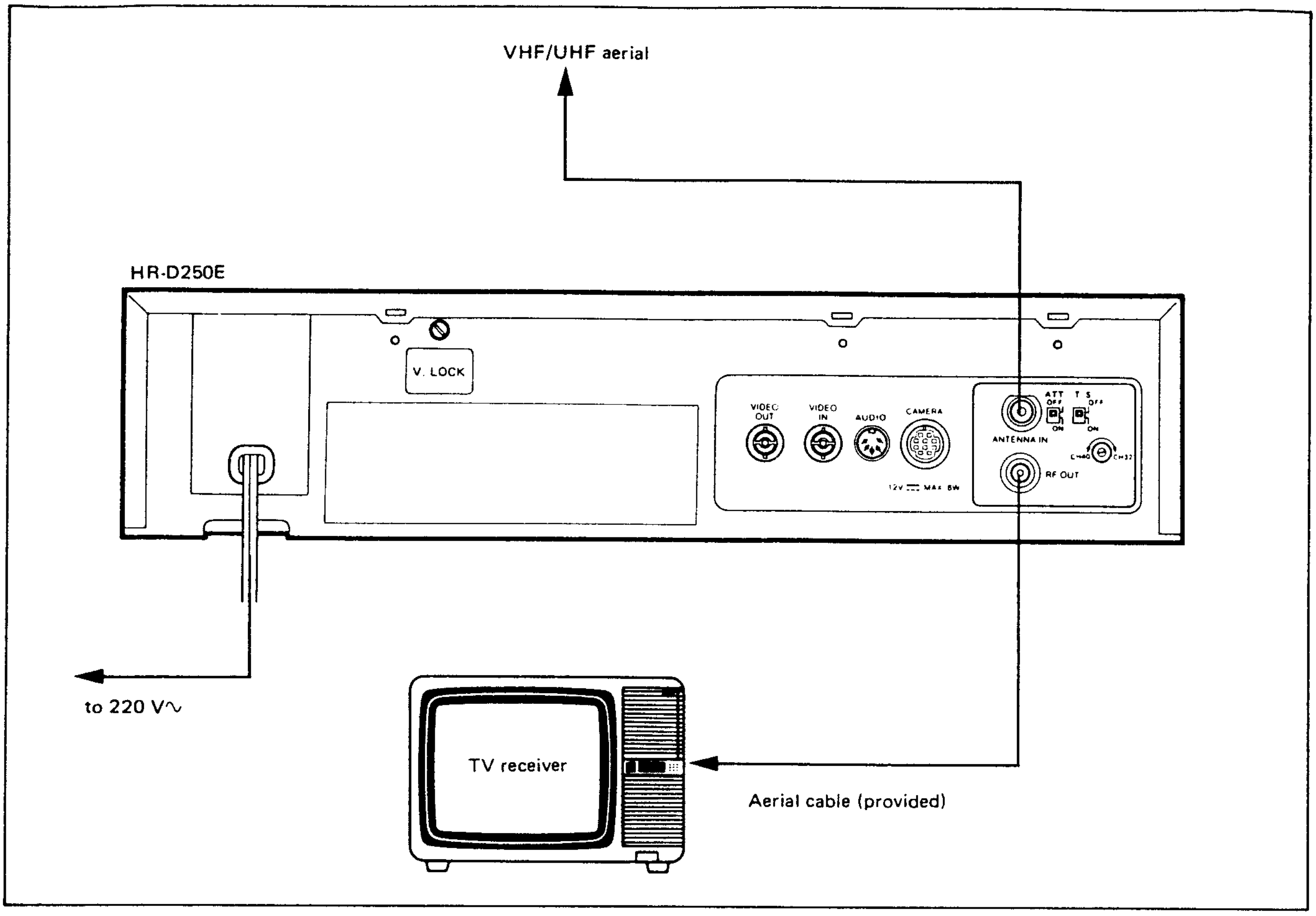
⑧ Test signal switch (T.S.)
Set to ON when tuning your TV receiver for the VIDEO CHANNEL. A test signal in the form of two vertical white bars will be available.

⑨ RF converter frequency adjustment screw
See page 10.

⑩ RF OUT connector
Connect to the aerial connector of a TV receiver through the aerial cable (provided).

⑪ Power cord

CONNECTIONS


VHF/UHF aerial
HR-D250E
V. LOCK
VIDEO OUT
VIDEO IN
AUDIO
CAMERA
12V ⎓ MAX 8W
ATT
OFF
ON
T S
OFF
ON
ANTENNA IN
CH40
CH32
RF OUT
to 220 V∿
TV receiver
Aerial cable (provided)

Procedure

- Remove the aerial cable from the TV receiver and reconnect to the HR-D250E as illustrated. The HR-D250E is then ready to record off-air programmes.
- Connect the HR-D250E to the TV receiver using the aerial cable (provided) as illustrated. The TV receiver is then ready to receive TV broadcast programmes as well as accommodate video cassette playback.

For reference

- Previously, when you were using only the TV receiver, broadcast signals went to the TV receiver directly from the aerial.

  Now, after you have connected the HR-D250E to the TV receiver, broadcast signals enter the HR-D250E directly from the aerial (to be received by the built-in tuner for recording onto the cassette tape) and go to the TV receiver through the HR-D250E (to be received by the TV receiver's tuner for ordinary viewing).

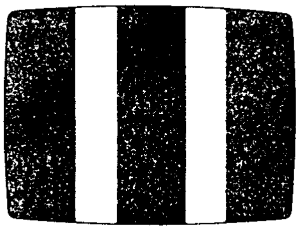
VIDEO CHANNEL SETTING

The built-in RF converter permits playback of video and audio recordings through a TV receiver. The signals from the RF converter are viewed through a vacant channel not used for broadcasting in your viewing area.

The converter channel of all units is set to UHF channel 36 prior to shipment. Setting your TV receiver to UHF channel 36 may provide video playback. However, to obtain the best possible reproduction on your TV receiver, accurate adjustment to the RF converter output is required.

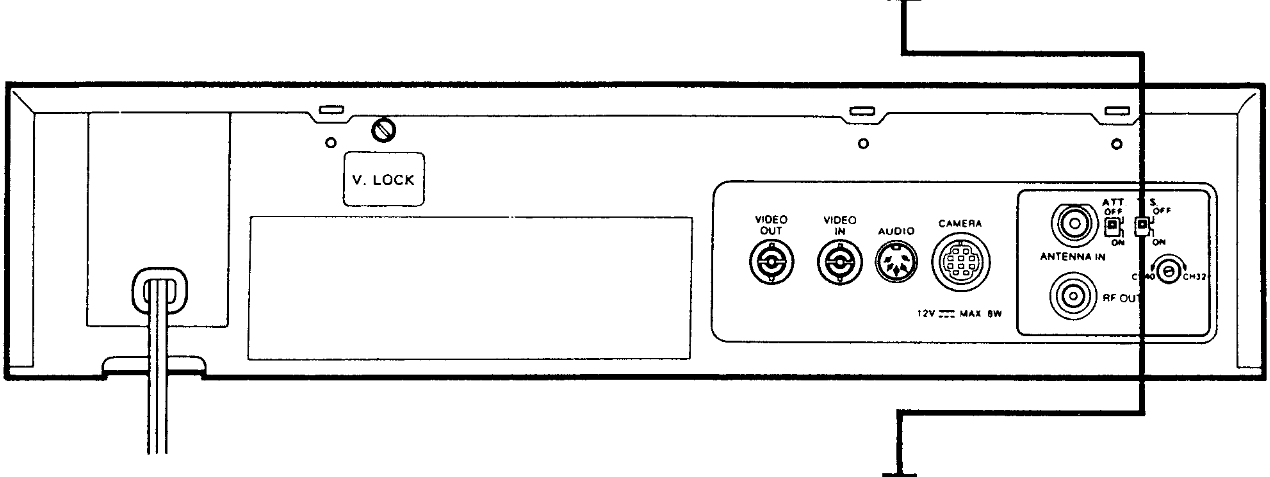
Procedure

1 Press the front panel OPERATE button to turn the indicator on. Turn on the TV receiver.



3 Adjust your TV receiver in the vicinity of UHF channel 36 until you bring in the two white signal bars on the screen as illustrated.
This setting is now the VIDEO CHANNEL of the TV receiver to which the HR-D250E is connected.

4 Reset the T.S. switch to OFF.

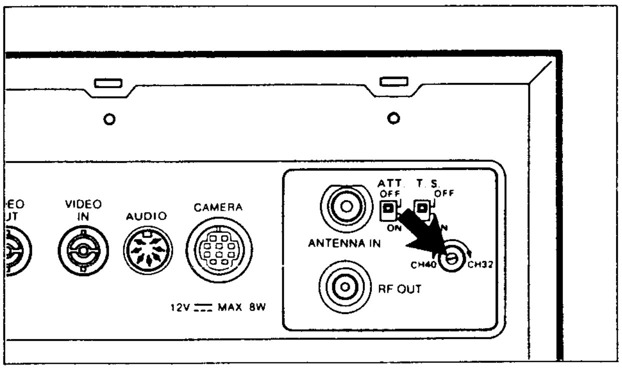


2 Set the T.S. switch, located on the rear panel, to ON.

Notes:

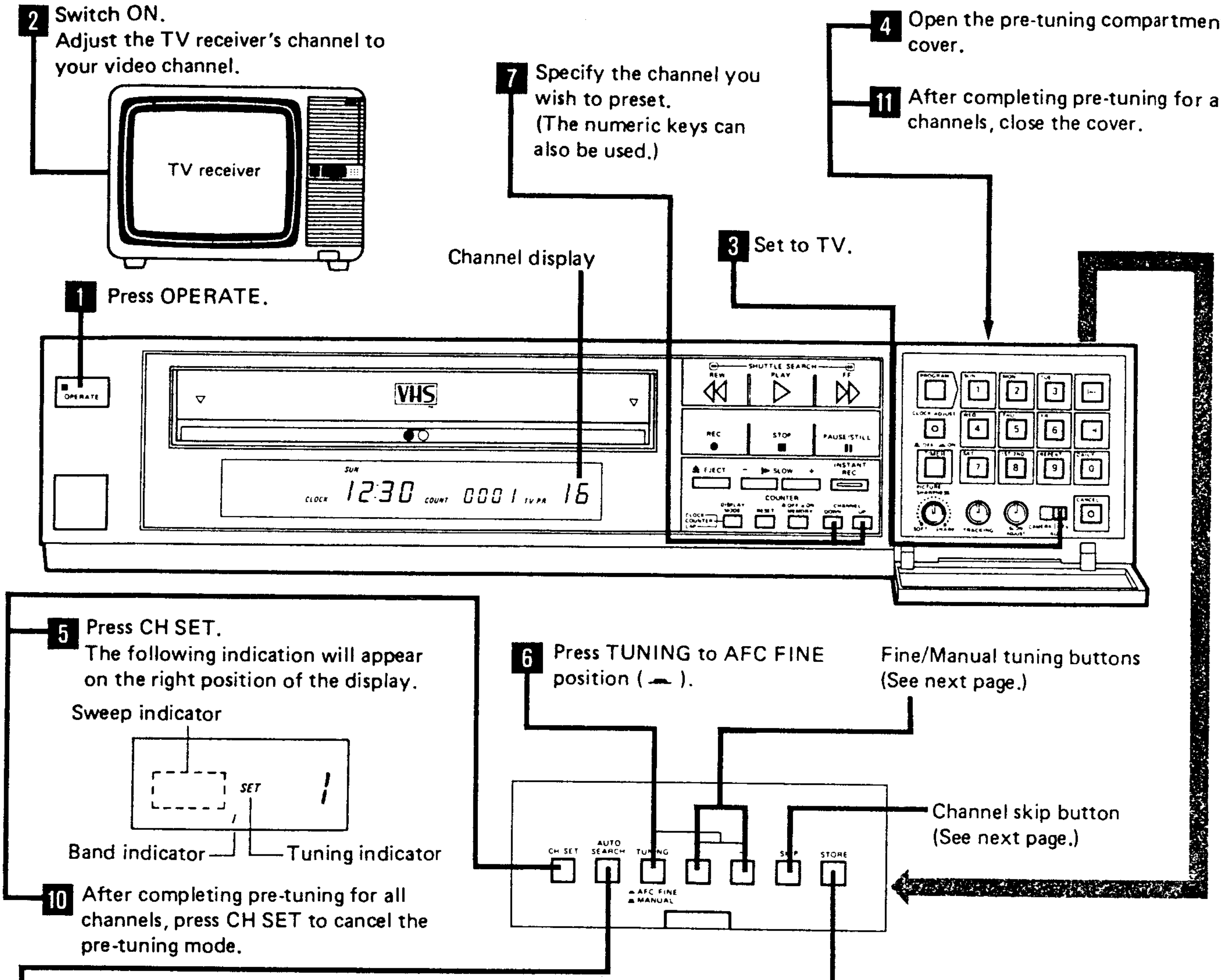
- When you adjust your TV receiver to channel 36 for video playback, if some interference noise is seen on the screen because of broadcasts on neighbouring channels or if your preset broadcasts should be affected in picture quality, it is necessary to shift the RF converter output frequency from that of channel 36.

  For this purpose, insert a screwdriver into a hole provided on the rear of the set and re-adjust the RF converter frequency adjustment screw in minute steps. Then tune the TV receiver once again until a clear picture is obtained.
  This adjustment requires extreme precision and must be done with the utmost care. We recommend that you consult your JVC dealer for making this adjustment.



- Be sure to set the T.S. switch to OFF after VIDEO CHANNEL tuning has been completed.
- No signal is available from the VIDEO OUT terminal while the test signal is being used.
- If a prerecorded VHS cassette is available, TV adjustment for VIDEO CHANNEL setting is also possible using it to obtain a playback picture. Insert the cassette and operate the HR-D250E for playing back the cassette. Then tune the TV receiver to obtain clear pictures and sound while monitoring the playback picture on the TV screen.
- If your TV receiver is not provided with an AFC circuit, perform fine tuning of the TV receiver when you are actually viewing video cassettes.

PRE-TUNING THE BUILT-IN TUNER


TV receiver
Channel display
VHS
SUN
CLOCK 12:30 COUNT 0001 TV PR 16
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE/STILL
EJECT
SLOW
INSTANT REC
COUNTER
CH SET
AUTO SEARCH
TUNING
SKIP
STORE
AFC FINE
MANUAL
Sweep indicator
SET
Band indicator
Tuning indicator
Fine/Manual tuning buttons (See next page.)
Channel skip button (See next page.)

1 Press OPERATE.

2 Switch ON. Adjust the TV receiver's channel to your video channel.

3 Set to TV.

4 Open the pre-tuning compartment cover.

5 Press CH SET. The following indication will appear on the right position of the display.

6 Press TUNING to AFC FINE position (▬).

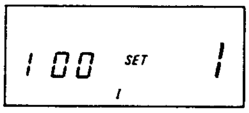
7 Specify the channel you wish to preset. (The numeric keys can also be used.)

10 After completing pre-tuning for all channels, press CH SET to cancel the pre-tuning mode.

11 After completing pre-tuning for all channels, close the cover.

8 Press AUTO SEARCH.

- Pressing this button initiates automatic scanning in the sequence of band I, III and U.
- "SET" and the band indicator (I, III or U) will blink as the auto-scanning process proceeds.
- The last 3 digits of the tape counter functions as a sweep indicator, changing from 00 to 100 for each band, to give a rough reference of where in each band tuning is being performed.



- Available channels in each band are as follows:
  VHF band I (47 – 111 MHz):
    CH. E2 – E4 (Common European channels)
    CH. S1 – S3, M1 (Belgium)
    CH, X, Y, Z, S1 (Switzerland)
    CH. S21 – S23, S1 (West Germany)
  VHF band III (111 – 300 MHz):
    CH. E5 – E12 (Common European channels)
    CH. M2 – M10, U1 – U10 (Belgium)
    CH. S2 – S10, S11 – S20 (West Germany, Switzerland)
  UHF band IV/V (470 – 862 MHz):
    CH. E21 – E69 (Common European channels)
- When any broadcast signal is detected, sweeping will automatically stop.

9 Press STORE.

- The SET indicator stops blinking.
- This permits the tuned-in station to be memorised so that you can call up the same station at any time by simply pressing the CHANNEL UP or DOWN button (or the numeric keys) to call up the corresponding channel number on the channel display.

CAUTION

- Proceed to next step after making sure that the SET indicator changes from blinking to lighting.

IMPORTANT INFORMATION ON PRE-TUNING

Additional information on the tuning procedure

- If no command is given for about 60 seconds after the CH SET button has been pressed, the channel display will return to the original with the TV PR. indicator illuminated.
- When specifying the channel you wish to preset, the CHANNEL buttons can be pressed either repeatedly for changing the number in a single increment or continuously held for rapid automatic changing.
- When sweeping stops in step 8, check to see if the received broadcast is your desired one or not.
- After tuning in step 8, be sure to press the STORE button, otherwise the tuned-in condition will be lost.
- After step 8, change the channel number and repeat steps 8 and 9 to preset all necessary channels.

Fine tuning

- When the TUNING button is in the AFC FINE position, the AFC circuit is in operation. Normally leave this button in the AFC FINE position. If, however, the picture quality is unsatisfactory due to ghosts or other noise, perform fine tuning after step 8.
- For this purpose, press either the - or + button so that the picture clears up. Each time either button is pressed; the picture condition changes in a single increment (continuous changing is not possible); 8 increments with the "-" button and 7 increments with the "+" button.
- If the picture is not clear after all procedures, perform fine tuning on your television.
- Distorted pictures or sound will be recorded if fine tuning has not been properly performed. Exercise care with this adjustment since the recorded picture and sound cannot be adjusted later.

Manual tuning

- With automatic tuning, only those stations which have a signal strength exceeding a certain level can be captured.
- To capture signals not strong enough for automatic tuning, employ manual tuning.
  (It is recommended that the ATT switch be set to OFF.)
- For this purpose, press the TUNING button to MANUAL (■).
- Then press either the - or + button depending on the search direction. Sweep tuning is performed only while the button is being pressed.
- When you capture a desired station, press the STORE button in the same manner as for automatic tuning, and the tuned-in station will be memorised.
- If the "-" or "+" button is pressed during auto-scan tuning, sweeping stops regardless of the position of the TUNING button.

Skipping unused channels

Though 32 channels are available for presetting to desired TV channels, you may not need all 32 channels. In such cases, unused channels can be skipped so that only preset channels will be called up. For this purpose, proceed as follows:

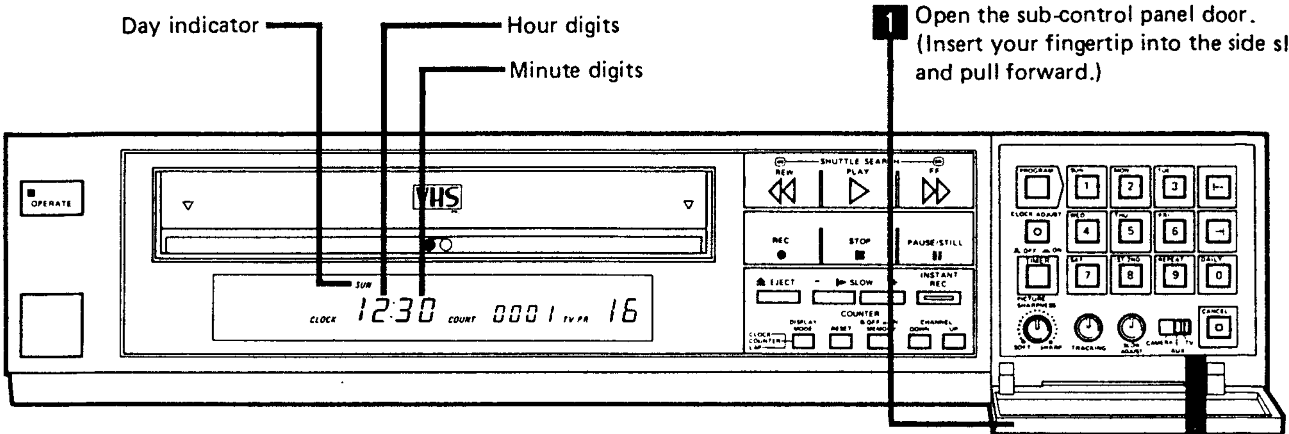
1) Press the CH SET button.
2) Call up the channel number that you wish to skip.
3) Press the SKIP button.
   - This completes the procedure for skipping the corresponding channel number.
4) Call up another channel number that you wish to skip and repeat the same procedure above.
5) Press the CH SET button to disengage this mode.

Notes:

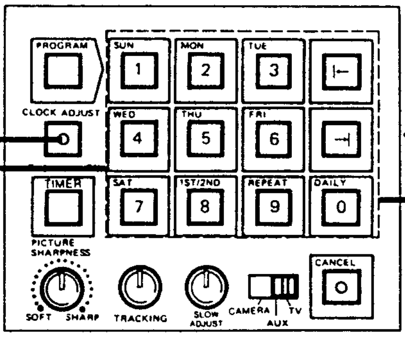
- After this mode is disengaged, those skipped channel numbers will not appear on the channel display any more in modes other than Channel Set. (Using the numeric keys, it is possible to call up the skipped channels.)
- In the Channel Set mode, all channel numbers including skipped ones are successively displayed when the CHANNEL buttons are pressed.
- It is possible to restore the skipped channels for presetting to another TV channel whenever necessary. For this purpose, call up the corresponding channel number in the Channel Set mode and perform pre-tuning. Press the STORE button. Then, the new TV station channel is memorised to be called up at any time.

CLOCK SETTING

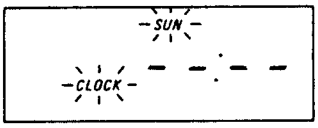
Plug the HR-D250E into an AC outlet. The display shows a flashing 0:00 with SUN and CLOCK illuminated.


Day indicator
Hour digits
Minute digits
VHS
SUN
CLOCK 12:30 COUNT 0001 TV/CH 16

1 Open the sub-control panel door. (Insert your fingertip into the side slot and pull forward.)


PROGRAM
SUN 1
MON 2
TUE 3
CLOCK ADJUST
WED 4
THU 5
FRI 6
TIMER
SAT 7
1ST/2ND 8
REPEAT 9
DAILY 0
PICTURE SHARPNESS
SOFT SHARP
TRACKING
SLOW ADJUST
CAMERA TV
AUX
CANCEL

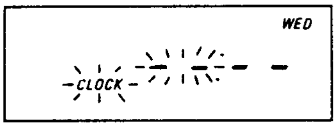
2 Press CLOCK ADJUST.
The display will change to the Clock Set mode with "SUN" and "CLOCK" flashing.



5 Press CLOCK ADJUST.

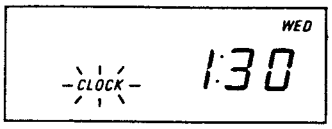
- Press it at the exact instant of the time signal, and the clock will be set accurately to the present time.

3 Press one of the numeric keys "1 (SUN)" to "7 (SAT)" that corresponds to the day of setting. The hour digits will start flashing.



4 Set the hour and minute in that order.

- The flashing position is ready for entry.
- To set a one-digit number, first press "0", then press the numeric key for 1 to 9.
- Zero will not be displayed in the tens place of the hour indication unless the cursor is moved back to the hour digits.
- For a two-digit number, simply press the corresponding numeric keys in the right order.
- In hour setting, numbers larger than 23 will be rejected.
- In minute setting, numbers larger than 59 will be rejected.

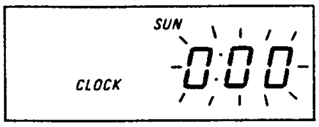

WED
CLOCK
1:30

Notes:

- If you press a wrong numeric key, you can return to the previous position using the reverse cursor key ⇤ .
- Once all necessary data have been entered, you can reach any position for correction using the reverse and forward cursor keys ⇤ ⇥ .
- Clock setting is not possible if the TIMER button is in the ON (▬) position. First check to see that it is in the OFF (▲) position.

Power failure indicator

The clock display may reset to 0:00 and start to flicker fast. This is not a malfunctioning of the clock, but it indicates that there has been a power failure in excess of one hour. Re-adjusting the time restores the normal condition of the clock display.


SUN
CLOCK
0:00

- If the period of power outage is within about 60 minutes, correct time-keeping continues when power is reapplied.
- During this 60-minute period, the built-in memory back-up capacitor maintains time-keeping and preset timer memory, though the display blacks out.

LOADING AND UNLOADING A CASSETTE

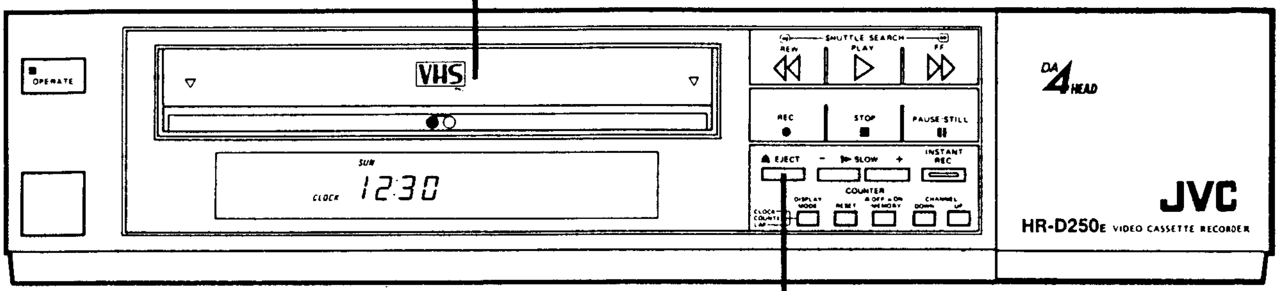
Loading

Insert a cassette with its labelled side facing you.

- With a cassette inserted, a door flap displays the ●○ mark to indicate "cassette inserted".

Note:

It might be that, after unpacking your new recorder, the "cassette inserted" mark can be seen already. This does not indicate a defective unit. Simply insert a cassette. After the first loading/unloading cycle, the door will function properly; the flap with the mark will appear when a cassette is inside and be replaced with one without a mark when the cassette is removed.


OPERATE
VHS
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE·STILL
EJECT
– SLOW +
INSTANT REC
COUNTER
DISPLAY MODE
RESET
OFF·ON MEMORY
CHANNEL DOWN UP
CLOCK COUNTER
SUN
CLOCK
12:30
DA 4 HEAD
JVC
HR-D250E VIDEO CASSETTE RECORDER

New motorised loading system

- The cassette can be loaded even when the power has not been turned on. Inserting a cassette into the loading slot turns the power on automatically.
- The cassette can be unloaded even when the power has been turned off. If a cassette is inside, pressing the EJECT button turns the power on automatically and, after ejection of the cassette, shuts it off automatically.

Unloading

Press EJECT. The cassette will be ejected.

Notes:

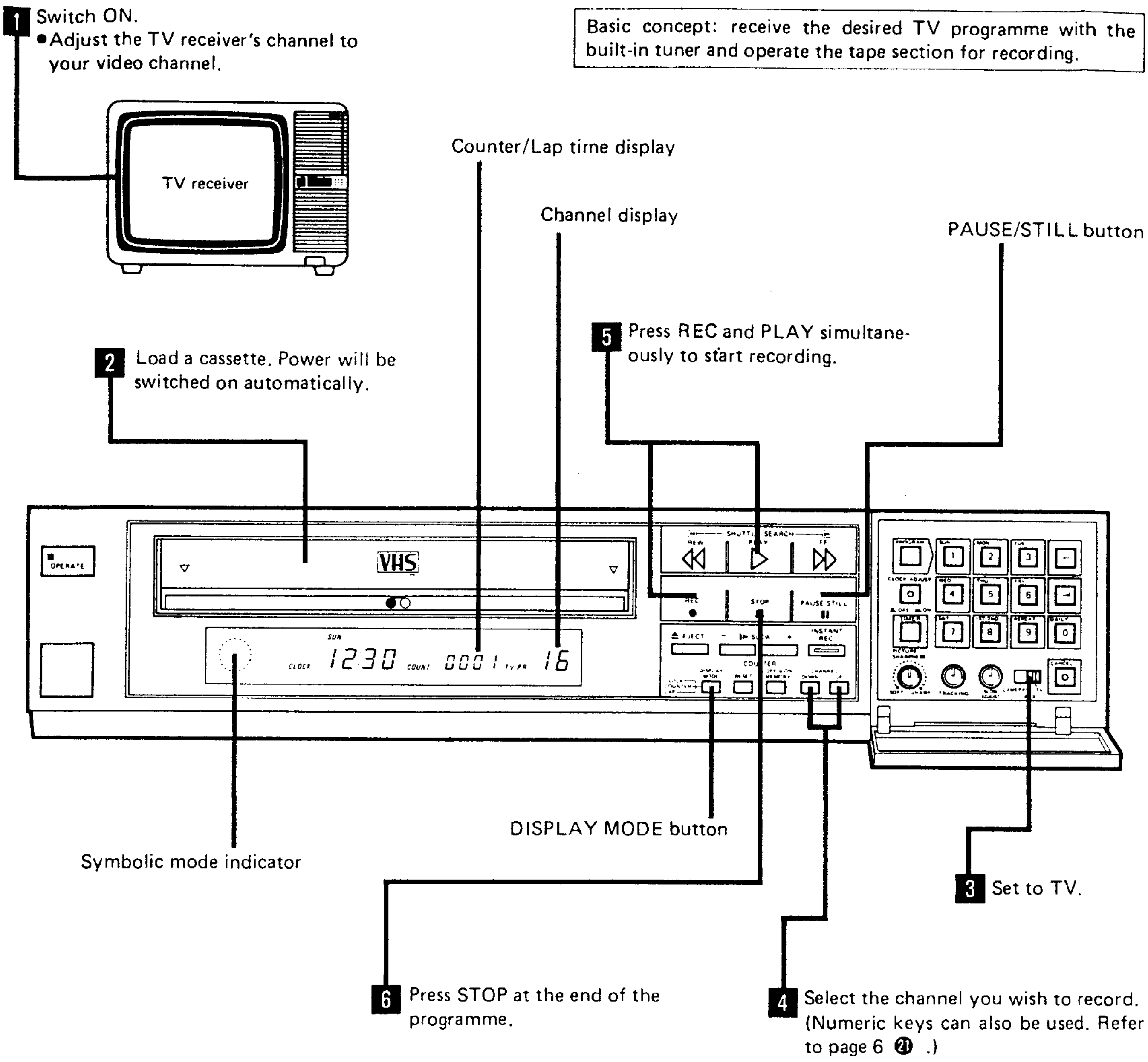
- Be sure to insert the cassette firmly into the slot; otherwise, it will be automatically ejected.
- The automatic loading mechanism will operate only when the cassette is inserted correctly.
- A cassette inverted cannot be inserted.

Caution

- If loading or unloading of a cassette is not possible, check to see whether the TIMER button is in the ON position. If so, press it to the OFF (■) position.
- Do not attempt to pull out the cassette once automatic loading has started.
- Do not insert fingers or any foreign object beyond the door flaps of the cassette loading slot, as this could lead to injury or damage to the mechanism. Show special caution with children.

RECORDING A TV PROGRAMME WHILE WATCHING IT

Basic concept: receive the desired TV programme with the built-in tuner and operate the tape section for recording.



1 Switch ON.
- Adjust the TV receiver's channel to your video channel.

2 Load a cassette. Power will be switched on automatically.

3 Set to TV.

4 Select the channel you wish to record. (Numeric keys can also be used. Refer to page 6 ㉑ .)

5 Press REC and PLAY simultaneously to start recording.

6 Press STOP at the end of the programme.

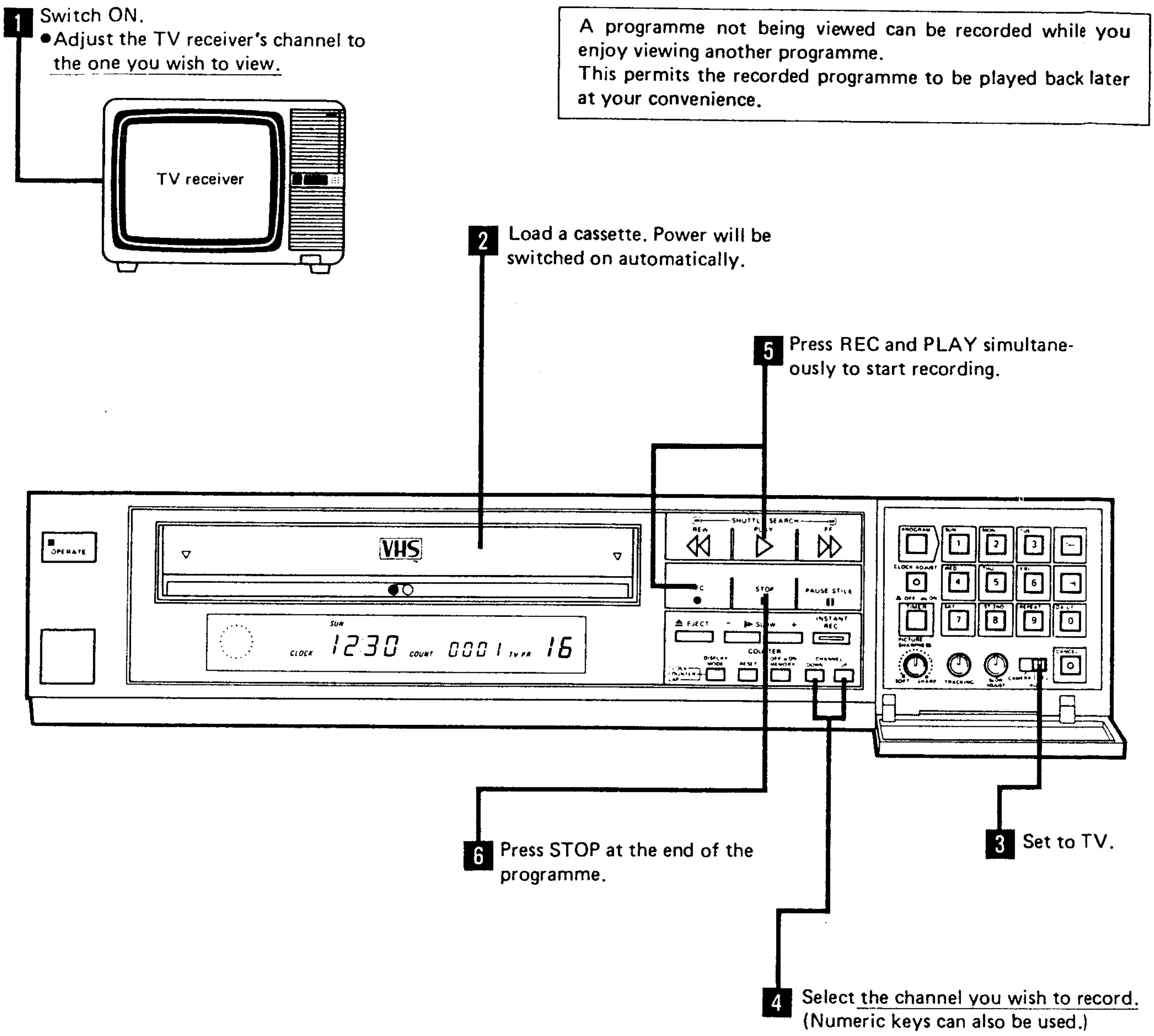
TV receiver
Counter/Lap time display
Channel display
PAUSE/STILL button
Symbolic mode indicator
DISPLAY MODE button
VHS
OPERATE
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE STILL
EJECT
INSTANT REC
COUNTER
SUN
CLOCK 12 30 COUNT 0001 TV/PR 16

Notes:

- If there is part of the programme you don't want to record, press the PAUSE/STILL button. To release the Pause mode, press the PLAY button.
- If the REC button cannot be engaged, check to see if the cassette safety tab has been removed.
- When the end of the tape is reached during recording, the tape is automatically rewound to the beginning and stops.
- Press the DISPLAY MODE button once to check how much recording time has elapsed. (For more details refer to page 18.)
- When recording is restarted from the Pause mode, assemble recording is performed so that the playback picture will not distort at the edit point. A few frames recorded before the pause are erased due to overlap of the new recording. This is not due to any defect of the unit.
- When the Pause mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- The built-in tuner's automatic channel lock mechanism prevents the selected channel from being altered during recording. Therefore, if you wish to change the channel during recording, first engage the Pause mode and then select a different channel.

RECORDING A TV PROGRAMME WHILE WATCHING ANOTHER

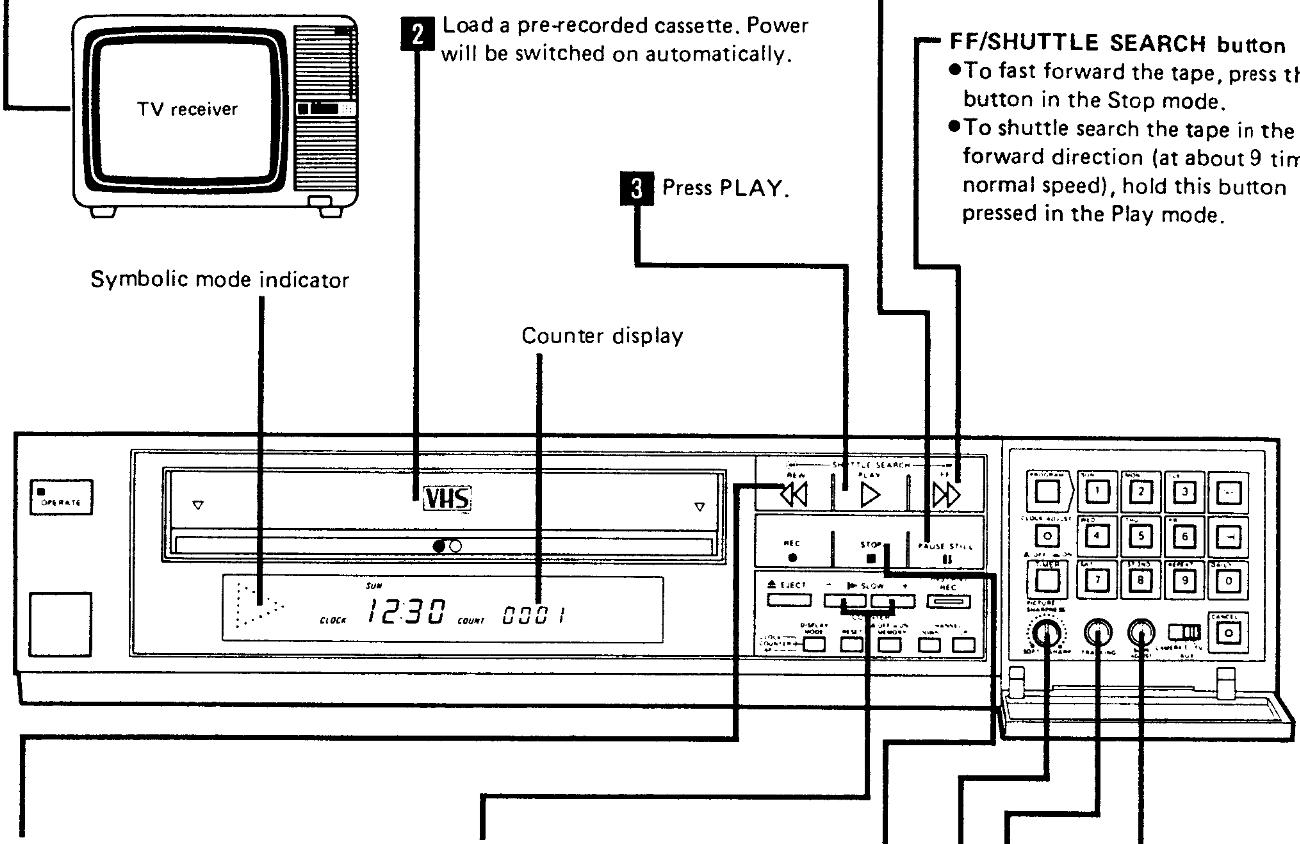
A programme not being viewed can be recorded while you enjoy viewing another programme.
This permits the recorded programme to be played back later at your convenience.


TV receiver
OPERATE
VHS
SUN
CLOCK 1230 COUNT 0001 TV.PR 16
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE STILL
EJECT
SLOW
INSTANT REC
COUNTER
1
2
3
4
5
6
7
8
9
0

1. Switch ON.
   - Adjust the TV receiver's channel to the one you wish to view.
2. Load a cassette. Power will be switched on automatically.
3. Set to TV.
4. Select the channel you wish to record. (Numeric keys can also be used.)
5. Press REC and PLAY simultaneously to start recording.
6. Press STOP at the end of the programme.

Notes:
The key points to be remembered:
- Select the channel you wish to record with the recorder's channel selector.
- Select the channel you wish to view with the TV receiver's channel selector.

PLAYING BACK A VIDEO CASSETTE



1 Switch ON.
Adjust the TV receiver's channel to the video channel.

2 Load a pre-recorded cassette. Power will be switched on automatically.

PAUSE/STILL button

FF/SHUTTLE SEARCH button
- To fast forward the tape, press this button in the Stop mode.
- To shuttle search the tape in the forward direction (at about 9 times normal speed), hold this button pressed in the Play mode.

3 Press PLAY.

Symbolic mode indicator

Counter display

REW/SHUTTLE SEARCH button
- To rewind the tape, press this button in the Stop mode.
- To shuttle search the tape in the reverse direction (at about 9 times normal speed), hold this button pressed in the Play mode.

SLOW buttons
Press either button to engage the Slow mode. Initial slow-motion speed is 1/40 normal. Then adjust the speed to your preference.
- To make it faster, press "+" button. Each time this button is pressed, the speed changes in sequence (1/40 → 1/20 → 1/10 → 1/6).
- To change back to slower speeds, press "-" button. Each time this button is pressed, the speed changes in sequence.

SLOW ADJUST control

TRACKING control

PICTURE SHARPNESS control

4 Press STOP at the end of the programme.

Notes:
- The tape-end auto rewind mechanism functions in both the Play and Fast Forward modes.
- Noise bars may appear on the screen if you play back a tape which was recorded using another recorder. In such cases, adjust the TRACKING control. Turn it in either direction to adjust the picture. After playing a particular tape, return the control knob to the centre position.
- When the PAUSE/STILL button is pressed during playback, a still picture will appear. The still picture can be advanced in a frame-by-frame manner each time this button is pressed.
- When the Still or Slow mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- With some televisions, the still picture may be unstable. This is not due to any defect of the unit.
- If noise bars are noticeable during slow-motion playback, attempt to correct by turning the SLOW ADJUST control.
- Pressing the SLOW "-" button does not result in reverse slow-motion playback.
- Picture sharpness can be varied to your preference by turning the PICTURE SHARPNESS control.

COUNTER MEMORY AND COUNTER/LAP FUNCTIONS

DISPLAY MODE button

When the power is turned on, the tape counter appears on the display with the COUNT indicator illuminated.

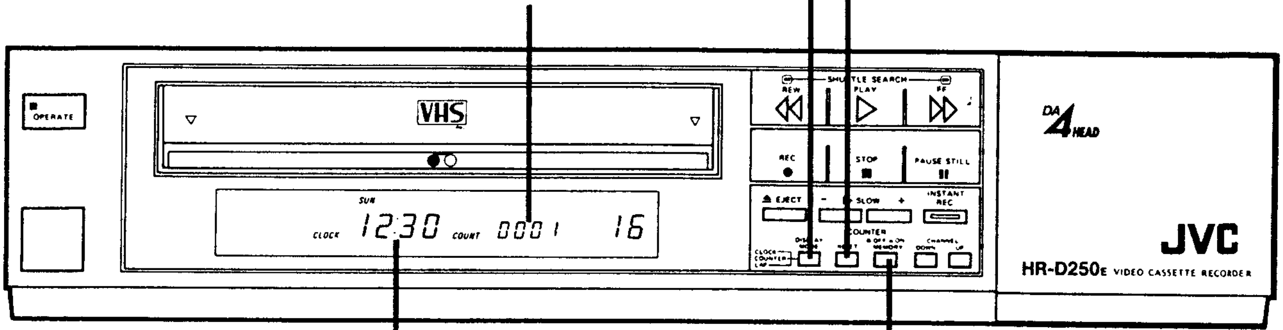
To change this Counter mode to the Lap Time mode to check the elapsed recording time, press the DISPLAY MODE button. The LAP indicator will illuminate and the display will change to the lap time counter.

To change the lap time counter mode back to the tape counter mode, press the same DISPLAY MODE button.

- The DISPLAY MODE button can also be used to change the display from the Timer Set mode to the Clock mode.

COUNTER RESET button

Press to reset the counter to "0000" for indexing the tape, or to reset the lap time to "0:00" for checking the elapsed recording time.



OPERATE
VHS
SUN
CLOCK 12:30 COUNT 0001 16
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE STILL
EJECT
SLOW
INSTANT REC
COUNTER
DISPLAY MODE
COUNTER MEMORY
CHANNEL
DOWN
UP
CLOCK COUNTER LAP
DA 4 HEAD
JVC
HR-D250E VIDEO CASSETTE RECORDER

Counter/Lap time display

Clock display

COUNTER MEMORY button

Counter Memory function

1. Press the DISPLAY MODE button to engage the Counter mode.
2. Press the COUNTER RESET button at a point which you may wish to locate later.
   - The tape counter will indicate "0000".
3. Press the COUNTER MEMORY button to ON (▬).
4. Press the REW (or FF) button when you need to return to the designated point. The tape will rewind (or fast forward) and stop at about the "0000" counter reading.

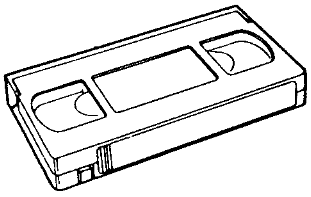
Notes:

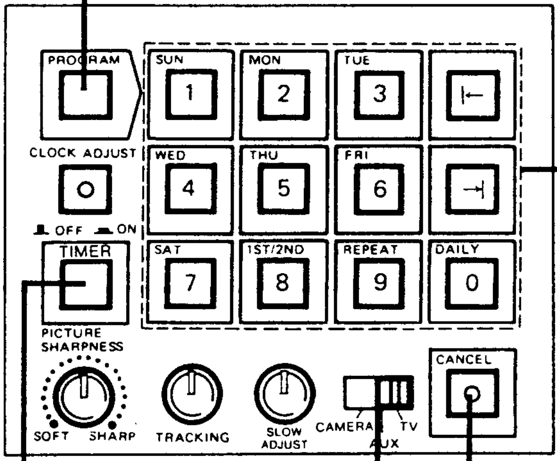
- The lap time is counted up to 99 hours, 59 minutes.
- Unless the COUNTER RESET button is pressed in the LAP mode, the count is maintained even after the OPERATE button is pressed to off (as long as the unit is plugged into an AC outlet).
- When the LAP mode is engaged during playback, counting does not take place, although the current count is displayed.

AUTOMATIC TIMER RECORDING

The built-in 14-day/4-event programmable timer permits recording of selected channels on preset days from preset start times to preset stop times.

1 **First of all, load a cassette (with safety tab in place); power will be switched on automatically.** Then open the sub-control panel and programme the timer following the instructions below.




PROGRAM
SUN
MON
TUE
1
2
3
|←
CLOCK ADJUST
0
WED
THU
FRI
4
5
6
→|
OFF
ON
TIMER
SAT
1ST/2ND
REPEAT
DAILY
7
8
9
0
PICTURE SHARPNESS
SOFT
SHARP
TRACKING
SLOW ADJUST
CAMERA
AUX
TV
CANCEL

2 Set to TV.

CANCEL button
To cancel the preset data. See next page.

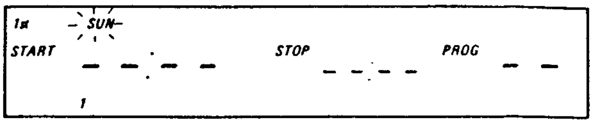
How to use the cursor keys

- If you press a wrong key and the flashing position has advanced, press |← to return to the previous position for correction.
- Once all data have been programmed, you can reach any position for correction using →| or |← . The flashing position is ready for re-entry.
- The cursor (flashing position) advances or returns in the following order.

Day ⇄ Start time ⇄ Stop time ⇄ Channel

(Pressing PROGRAM engages the check mode in which no position flashes and data correction is not possible. To correct the data, press either cursor keys; →| to move to "Day" or |← to move to "Channel".

3 Press PROGRAM.
The display will change to the Timer Set mode with "SUN" flashing. You are ready to enter the data into No. 1 programme memory. To advance to programme numbers 2 – 4, press again. After programme 4, the Clock mode will be engaged.

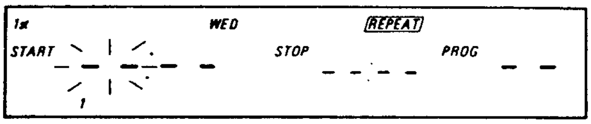

1st
SUN
START
STOP
PROG

4 Enter the day by pressing one of the numeric keys (1 to 7 for one particular day of the week or 0 for everyday serial recording). The hour digits of the "START" time will start flashing.

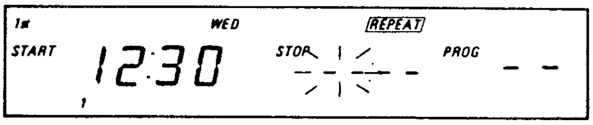
1ST/2ND 8
- To set for the 2nd week, press 8 either before or after entering the day.

REPEAT 9
- To set for weekly serial recording, press 9 .

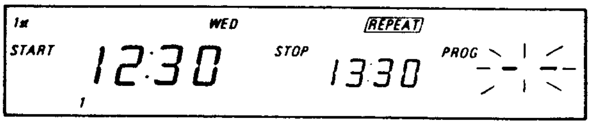
DAILY 0
- Pressing 0 sets for daily serial recording that will continue week after week. Pressing 9 then cancels weekly repetition so that daily serial recording takes place only for one week.


1st
WED
REPEAT
START
STOP
PROG

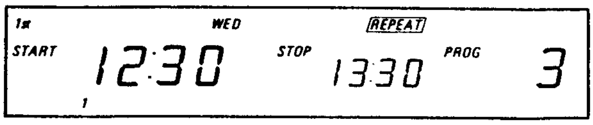
5 Key in the start time.
- To key in a one-digit number of hours or minutes, first press 0. Then press the relevant number key.
- The minute digits will start flashing after keying in the hour.
- The hour digits of the "STOP" time will start flashing after keying in the start time.


1st
WED
REPEAT
START
12:30
STOP
PROG

6 Key in the stop time in the same manner as the start time.
- The digits of the channel display will start flashing after keying in the stop time.


1st
WED
REPEAT
START
12:30
STOP
13:30
PROG

7 Enter the channel.
- To set a two-digit channel number, press 0 once for 10, twice for 20, three times for 30.
For example, to set for channel 16, press 0 once and then 6. To set channel 26 , press 0 twice and then 6. For channels 10, 20 and 30, allow for a few seconds after pressing 0 the required number of times.
For a one-digit channel number, simply press the corresponding numeric key.


1st
WED
REPEAT
START
12:30
STOP
13:30
PROG
3

8 Press TIMER.
- The TIMER indicator will light.
- The display will return to the Clock mode, also showing the programme numbers for which recording data has been programmed.

IMPORTANT INFORMATION ON TIMER RECORDING

Setting the START and STOP times

- It is not possible to set the START and STOP times unless the clock time has previously been set.
- Enter the data while the digit positions are flashing.
- Unless the START time has been properly set, STOP time setting is not possible.
- The STOP time can be set within 24 hours from the START time. If the hour setting for the STOP time runs into the following day, there is no need to set the day. Recording will stop at the preset time on the following day, even though the day indication is not displayed.
- Non-applicable numbers (such as 24 or larger for hours, 60 or larger for minutes and 33 or larger for channels) will be rejected when keyed in.

Last-channel memory

- The currently tuned channel locks in the Timer Set mode and, when the display returns to the Clock mode, the locked channel is displayed.

1ST/2ND and REPEAT buttons

- During the day set mode (before entering any digits for the start time), it is possible to switch between 1st or 2nd week by pressing the 1ST/2ND ($\boxed{8}$) key or between single (no REPEAT indicator) or weekly repeat (with REPEAT indicator) by pressing the REPEAT ($\boxed{9}$) key.

Cancelling the preset data

- The preset programmes can be cancelled by pressing the CANCEL button. For this purpose, first engage the Timer Set mode for the number you wish to cancel and then press the CANCEL button.

Checking the programmed data

- Checking and re-programming can be performed anytime, even when the TIMER button has already been engaged in the ON position.
- While recording is actually taking place, the STOP time can be changed. For this purpose, engage the Timer Set mode and move the cursor; only "STOP" time will flash. This means you can re-programme the stop time.
- While recording is actually taking place according to one preset programme, all other preset programmes can be checked or re-programmed.

TIMER indicator

- When the TIMER button is pressed to ON with a cassette loaded and the timer correctly programmed, the TIMER indicator on the display will light with the corresponding programm number(s) also lighting and the power is turned off.
- When you have preset several programmes at a time, confirm that all the preset programme numbers light together with the TIMER indicator when the TIMER button is pressed. The programme whose number does not light has not been correctly preset. Recheck the programmed data.
- Programming errors include cases where either "START" or "STOP" time has not been preset, or both these preset times are the same. A "no-channel-programmed" situation is not interpreted as an error, and recording will be made of the currently tuned channel.
- If all programmes have been wrongly preset, the TIMER indicator will flash for about 10 seconds when the TIMER button is pressed, and remain lit.
- If the TIMER button is pressed when a cassette is not loaded, the TIMER indicator will continue blinking.
- If a cassette with its safety tab removed has been loaded, it will be ejected automatically when the TIMER button is pressed. The TIMER indicator will continue blinking.
- As long as the TIMER button is in the ON position, loading or unloading of a cassette is not possible.
- To re-load a cassette after the TIMER button is pressed to ON (the OPERATE indicator turns off), press it once to OFF. Although the OPERATE indicator remains off, you can load a cassette (the OPERATE indicator lights). Then press the TIMER button once again to ON.

Programme priority

- If you have preset two programmes for the same day and the same start time, the setting corresponding to the smaller programme number has priority.
- If two programmes have preset times which overlap, the earlier-started programme will be interrupted by the later one.

Timer operation

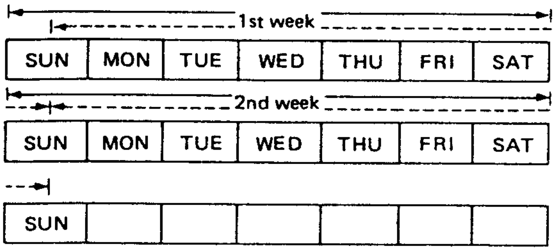
- Tape loading starts 10 seconds before the preset START time and the recording start signal is triggered 2 seconds before the preset time so that recording starts exactly at the preset time.
- During timer recording, the number of the programme that is presently operating will be flashing.
- After timer recording, the power is switched off and the auto rewind mechanism does not function. If the end of the tape is reached during timer recording, the cassette is automatically ejected and then the power is switched off.
- After a power failure has occurred (refer to page 13, "Power failure indicator"), all programmed data are cancelled.

FOR A BETTER UNDERSTANDING OF THE PROGRAMMABLE TIMER

Two-week timer

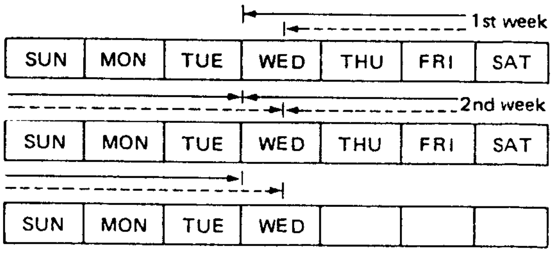
"Two-week" presetting capacity means that you can "reserve" recordings on any one of 14 days in advance including the day of setting.

If the current day of setting is Sunday:



- In this situation, there may be no possibility of confusion in setting the day.
- Namely, the "1st MON" is Monday of the current week and the "2nd MON" is Monday of the next week. The same applies to other week days.
- Regarding Sunday, there are two different cases; one is that you are going to set the timer to a time before the current time of setting and the other is that the preset time is a time after the current time of setting.
- In the former case, the "1st SUN" is the next Sunday and the "2nd SUN" is the Sunday after next.
- In the latter case, the "1st SUN" is the current Sunday and the "2nd SUN" is Sunday of the next week.

If the current day of setting is Wednesday for example:



- Remember that the "1st MON", "1st TUE" and so on . . . mean the first coming Monday, the first coming Tuesday, and so on, and not Monday of the current week.
- Similarly, the "2nd MON", "2nd TUE" and so on . . . are the second coming Monday, the second coming Tuesday, and so on, and not Monday or Tuesday of the next week.
- If you are on Wednesday for example, and wish to record something on Tuesday of the next week, the preset data should be "1st TUE". To record on Thursday of the next week, set "2nd THU".
- Regarding Wednesday, the same as mentioned about Sunday on the left applies.

4-programme timer

"4-programme" presetting capacity means that you can have 4 separate programme entries which contain different programming data. Because of this capacity, you can even "reserve" 4 different TV programmes, either on the same day or on different days.

Each programme (No. 1 through No. 4) entry contains information on "TV channel number", "day", "start time", "stop time" and "either single or repeat".

Example of the contents of one programme entry:

Programme number	TV channel number	Day	Start time	Stop time	Repeat
2	12	1st WED	10:30	11:30	–

Variety of setting possibilities

Setting	Indication
One day of the 1st week	1st + Day
One day of the 2nd week	2nd + Day
One day of every week starting from the 1st week	1st + Day + REPEAT
One day of every week starting from the 2nd week	2nd + Day + REPEAT
Daily serial recording week after week starting from the 1st week	All days + REPEAT1)
Daily serial recording for one week starting from the 1st week	All days2)

1) When the DAILY (0) key is pressed, the REPEAT indicator will light automatically.

2) After pressing the DAILY (0) key, press the REPEAT (9) key to cancel the REPEAT indicator.

INSTANT RECORDING

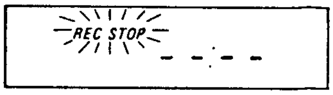
Besides starting and stopping a recording as usual, the HR-D250E offers a more convenient possibility: starting by the push of a single button, and recording will stop automatically after a certain period of time. Use this facility for starting a recording before you go to bed or leave home.

1 Load a cassette.

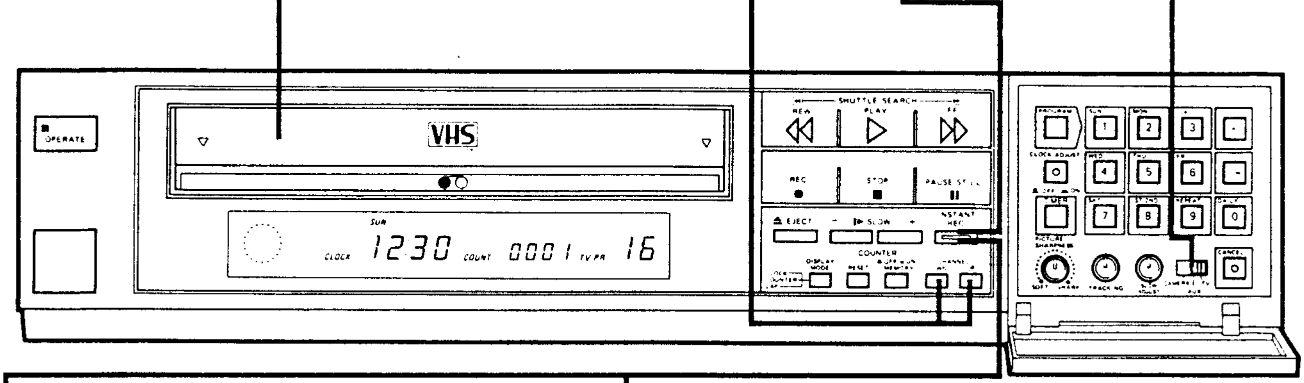
3 Select the channel from which you want to record. (Numeric keys can also be used.)

4 Press INSTANT REC.

- The following indication will appear on the display, to show that the recorder is ready to start recording.
- The REC STOP indicator on the display will flash.

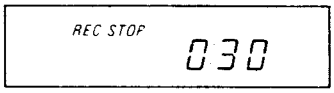


2 Set to TV.



5 Press INSTANT REC once again.

- Recording will begin immediately and the following indication will appear on the display, showing that recording will automatically stop and power will switch off after 30 minutes.
- The REC STOP indicator remains lit.



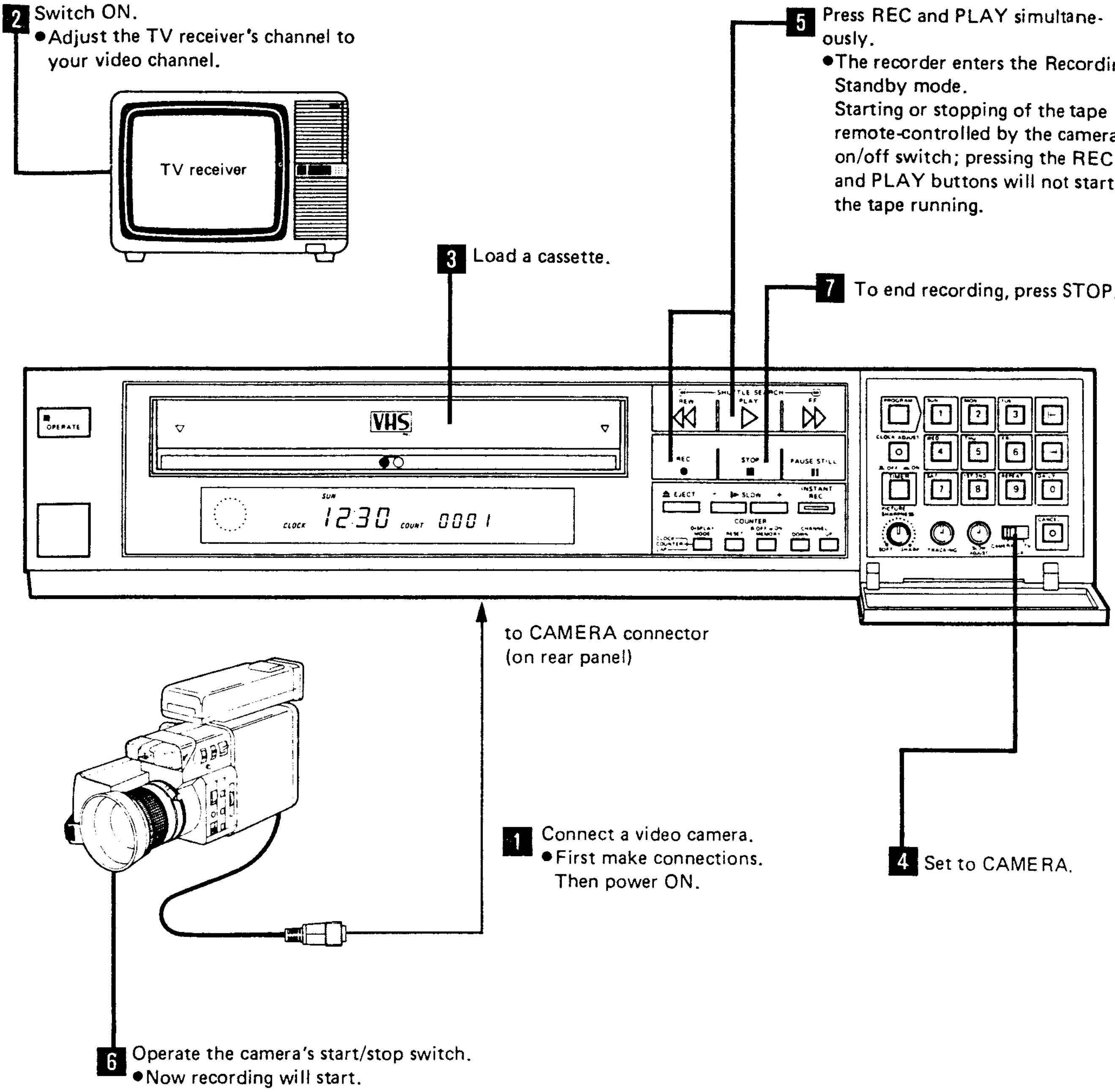
6 Each time the INSTANT REC button is pressed, recording time increases by 30 minutes up to 4 hours.

- For a more precise time setting, use the numeric keys after recording has started. To change both hour and minute digits, simply key in the corresponding numbers. To change only the minute digits, press the numeric key corresponding the current hour number, and the cursor will move to the minute position, thereafter the cursor keys will function to move to both hour and minute digits for new entries. After this setting, be sure to press the INSTANT REC button again, otherwise the original preset time will be restored in a few seconds.

Notes:

- If the INSTANT REC button is not pressed a second time within about 10 seconds after it has been pressed once, the Instant Record mode will be cancelled and the display will change back to the Counter mode.
- If you want to change the time setting again after the INSTANT REC button has been pressed for memorization of new data, simply press INSTANT REC and redo the programming.
- While recording is in progress, the displayed time counts down; when 0:00 is reached, the Record mode is released after 10 seconds and the power is switched off.
- If you want to stop recording after having started recording in the Instant Record mode, press the STOP button.
- The instant recording function can also be used as a sleep timer. If you press the INSTANT REC button during normal recording, the REC STOP indicator will light on the display and the indication "0:30" will be obtained, showing that recording will stop automatically after 30 minutes. The time span can be adjusted in the same way as for instant recording.
- Instant recording has priority over all other modes; you can start recording from any mode using the INSTANT REC button, even from rewind or fast forward, or from power off (as long as the power cord is plugged in).
- If the INSTANT REC button is pressed with a non-recordable cassette loaded (one with its safety tab removed), the cassette will be automatically ejected.
- If you want to perform instant recording after you have set the timer and pressed the TIMER button to ON, press the INSTANT REC button as usual. Power will be turned on and instant recording will start. After instant recording has been performed, the Timer mode is automatically re-entered and power is turned off. The preset time for instant recording has priority over the programmed preset times. Before pressing the INSTANT REC button, make sure that the instant recording time will not eventually overlap the programmed preset times.
- If the programmed switch-on time for a timer recording should come after the switch-off time of the instant recording, this timer recording will still be made automatically.

RECORDING WITH A VIDEO CAMERA


TV receiver
VHS
OPERATE
REW
PLAY
FF
REC
STOP
PAUSE STILL
EJECT
SLOW
INSTANT REC
COUNTER
CLOCK 12:30 COUNT 0001

1 Connect a video camera.
- First make connections. Then power ON.

to CAMERA connector (on rear panel)

2 Switch ON.
- Adjust the TV receiver's channel to your video channel.

3 Load a cassette.

4 Set to CAMERA.

5 Press REC and PLAY simultaneously.
- The recorder enters the Recording Standby mode. Starting or stopping of the tape is remote-controlled by the camera's on/off switch; pressing the REC and PLAY buttons will not start the tape running.

6 Operate the camera's start/stop switch.
- Now recording will start.

7 To end recording, press STOP.

Notes:
- If feedback noise (whistling or howling) is heard from the TV receiver, reduce the volume or move the microphone, being used, farther away from the TV receiver.
- For camera operation refer to the instruction manual for the relevant camera.

IMPORTANT INFORMATION ON TIMER RECORDING

Setting the START and STOP times

- It is not possible to set the START and STOP times unless the clock time has previously been set.
- Enter the data while the digit positions are flashing.
- Unless the START time has been properly set, STOP time setting is not possible.
- The STOP time can be set within 24 hours from the START time. If the hour setting for the STOP time runs into the following day, there is no need to set the day. Recording will stop at the preset time on the following day, even though the day indication is not displayed.
- Non-applicable numbers (such as 24 or larger for hours, 60 or larger for minutes and 33 or larger for channels) will be rejected when keyed in.

Last-channel memory

- The currently tuned channel locks in the Timer Set mode and, when the display returns to the Clock mode, the locked channel is displayed.

1ST/2ND and REPEAT buttons

- During the day set mode (before entering any digits for the start time), it is possible to switch between 1st or 2nd week by pressing the 1ST/2ND (8) key or between single (no REPEAT indicator) or weekly repeat (with REPEAT indicator) by pressing the REPEAT (9) key.

Cancelling the preset data

- The preset programmes can be cancelled by pressing the CANCEL button. For this purpose, first engage the Timer Set mode for the number you wish to cancel and then press the CANCEL button.

Checking the programmed data

- Checking and re-programming can be performed anytime, even when the TIMER button has already been engaged in the ON position.
- While recording is actually taking place, the STOP time can be changed. For this purpose, engage the Timer Set mode and move the cursor; only "STOP" time will flash. This means you can re-programme the stop time.
- While recording is actually taking place according to one preset programme, all other preset programmes can be checked or re-programmed.

TIMER indicator

- When the TIMER button is pressed to ON with a cassette loaded and the timer correctly programmed, the TIMER indicator on the display will light with the corresponding programm number(s) also lighting and the power is turned off.
- When you have preset several programmes at a time, confirm that all the preset programme numbers light together with the TIMER indicator when the TIMER button is pressed. The programme whose number does not light has not been correctly preset. Recheck the programmed data.
- Programming errors include cases where either "START" or "STOP" time has not been preset, or both these preset times are the same. A "no-channel-programmed" situation is not interpreted as an error, and recording will be made of the currently tuned channel.
- If all programmes have been wrongly preset, the TIMER indicator will flash for about 10 seconds when the TIMER button is pressed, and remain lit.
- If the TIMER button is pressed when a cassette is not loaded, the TIMER indicator will continue blinking.
- If a cassette with its safety tab removed has been loaded, it will be ejected automatically when the TIMER button is pressed. The TIMER indicator will continue blinking.
- As long as the TIMER button is in the ON position, loading or unloading of a cassette is not possible.
- To re-load a cassette after the TIMER button is pressed to ON (the OPERATE indicator turns off), press it once to OFF. Although the OPERATE indicator remains off, you can load a cassette (the OPERATE indicator lights). Then press the TIMER button once again to ON.

Programme priority

- If you have preset two programmes for the same day and the same start time, the setting corresponding to the smaller programme number has priority.
- If two programmes have preset times which overlap, the earlier-started programme will be interrupted by the later one.

Timer operation

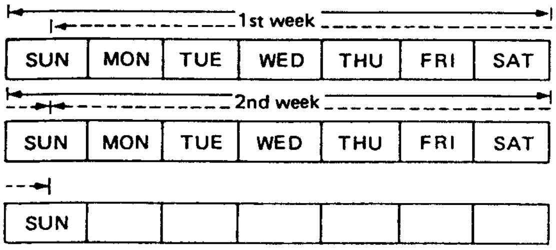
- Tape loading starts 10 seconds before the preset START time and the recording start signal is triggered 2 seconds before the preset time so that recording starts exactly at the preset time.
- During timer recording, the number of the programme that is presently operating will be flashing.
- After timer recording, the power is switched off and the auto rewind mechanism does not function. If the end of the tape is reached during timer recording, the cassette is automatically ejected and then the power is switched off.
- After a power failure has occurred (refer to page 13, "Power failure indicator"), all programmed data are cancelled.

FOR A BETTER UNDERSTANDING OF THE PROGRAMMABLE TIMER

Two-week timer

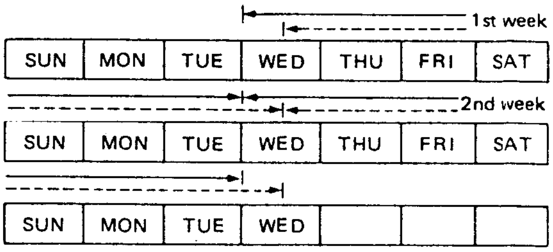
"Two-week" presetting capacity means that you can "reserve" recordings on any one of 14 days in advance including the day of setting.

If the current day of setting is Sunday:



- In this situation, there may be no possibility of confusion in setting the day.
- Namely, the "1st MON" is Monday of the current week and the "2nd MON" is Monday of the next week. The same applies to other week days.
- Regarding Sunday, there are two different cases; one is that you are going to set the timer to a time before the current time of setting and the other is that the preset time is a time after the current time of setting.
- In the former case, the "1st SUN" is the next Sunday and the "2nd SUN" is the Sunday after next.
- In the latter case, the "1st SUN" is the current Sunday and the "2nd SUN" is Sunday of the next week.

If the current day of setting is Wednesday for example:



- Remember that the "1st MON", "1st TUE" and so on . . . mean the first coming Monday, the first coming Tuesday, and so on, and not Monday of the current week.
- Similarly, the "2nd MON", "2nd TUE" and so on . . . are the second coming Monday, the second coming Tuesday, and so on, and not Monday or Tuesday of the next week.
- If you are on Wednesday for example, and wish to record something on Tuesday of the next week, the preset data should be "1st TUE". To record on Thursday of the next week, set "2nd THU".
- Regarding Wednesday, the same as mentioned about Sunday on the left applies.

4-programme timer

"4-programme" presetting capacity means that you can have 4 separate programme entries which contain different programming data. Because of this capacity, you can even "reserve" 4 different TV programmes, either on the same day or on different days.

Each programme (No. 1 through No. 4) entry contains information on "TV channel number", "day", "start time", "stop time" and "either single or repeat".

Example of the contents of one programme entry:

Programme number	TV channel number	Day	Start time	Stop time	Repeat
2	12	1st WED	10:30	11:30	–

Variety of setting possibilities

Setting	Indication
One day of the 1st week	1st + Day
One day of the 2nd week	2nd + Day
One day of every week starting from the 1st week	1st + Day + REPEAT
One day of every week starting from the 2nd week	2nd + Day + REPEAT
Daily serial recording week after week starting from the 1st week	All days + REPEAT[1]
Daily serial recording for one week starting from the 1st week	All days[2]

1) When the DAILY ($\boxed{0}$) key is pressed, the REPEAT indicator will light automatically.
2) After pressing the DAILY ($\boxed{0}$) key, press the REPEAT ($\boxed{9}$) key to cancel the REPEAT indicator.

INSTANT RECORDING

Besides starting and stopping a recording as usual, the HR-D250E offers a more convenient possibility: starting by the push of a single button, and recording will stop automatically after a certain period of time. Use this facility for starting a recording before you go to bed or leave home.

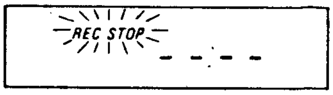
1 Load a cassette.

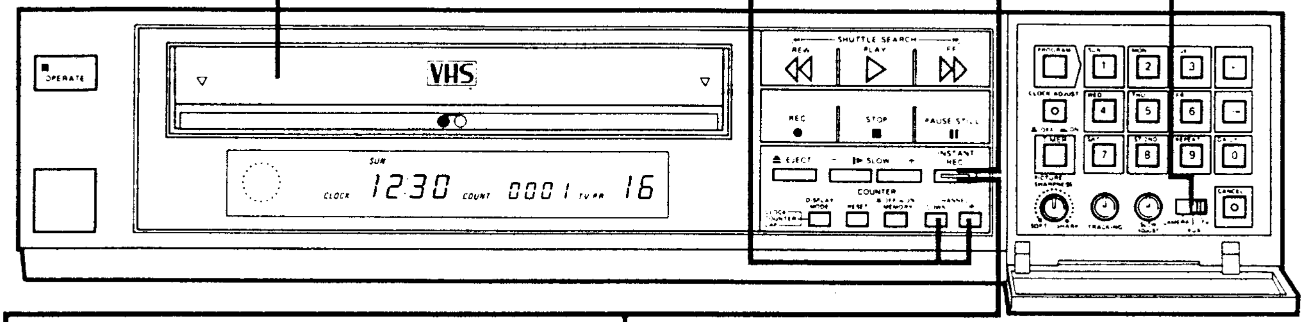
2 Set to TV.

3 Select the channel from which you want to record. (Numeric keys can also be used.)

4 Press INSTANT REC.

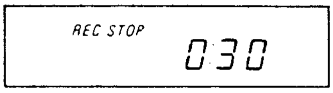
- The following indication will appear on the display, to show that the recorder is ready to start recording.
- The REC STOP indicator on the display will flash.





5 Press INSTANT REC once again.

- Recording will begin immediately and the following indication will appear on the display, showing that recording will automatically stop and power will switch off after 30 minutes.
- The REC STOP indicator remains lit.



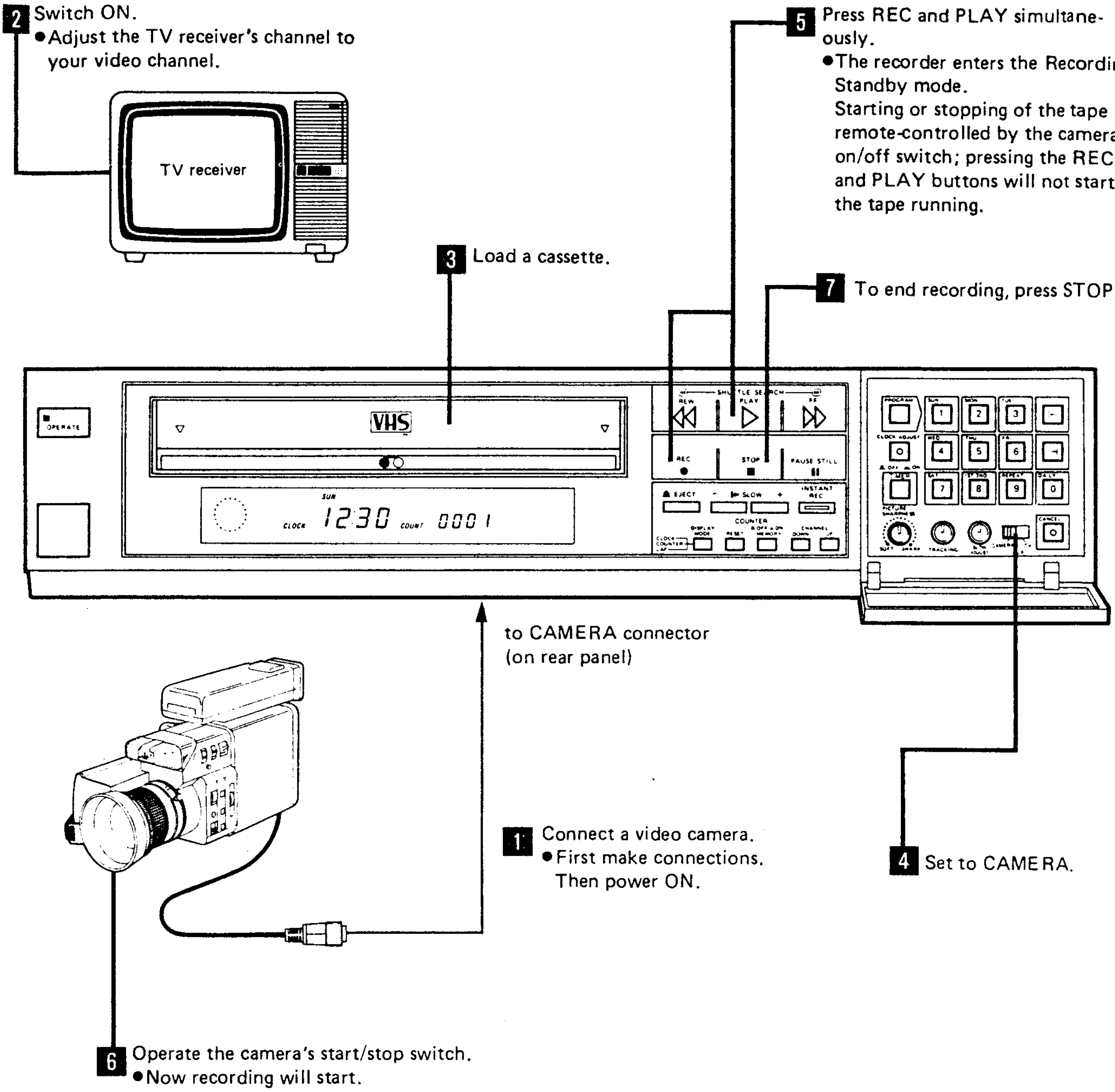
6 Each time the INSTANT REC button is pressed, recording time increases by 30 minutes up to 4 hours.

- For a more precise time setting, use the numeric keys after recording has started. To change both hour and minute digits, simply key in the corresponding numbers. To change only the minute digits, press the numeric key corresponding the current hour number, and the cursor will move to the minute position, thereafter the cursor keys will function to move to both hour and minute digits for new entries. After this setting, be sure to press the INSTANT REC button again, otherwise the original preset time will be restored in a few seconds.

Notes:

- If the INSTANT REC button is not pressed a second time within about 10 seconds after it has been pressed once, the Instant Record mode will be cancelled and the display will change back to the Counter mode.
- If you want to change the time setting again after the INSTANT REC button has been pressed for memorization of new data, simply press INSTANT REC and redo the programming.
- While recording is in progress, the displayed time counts down; when 0:00 is reached, the Record mode is released after 10 seconds and the power is switched off.
- If you want to stop recording after having started recording in the Instant Record mode, press the STOP button.
- The instant recording function can also be used as a sleep timer. If you press the INSTANT REC button during normal recording, the REC STOP indicator will light on the display and the indication "0:30" will be obtained, showing that recording will stop automatically after 30 minutes. The time span can be adjusted in the same way as for instant recording.
- Instant recording has priority over all other modes; you can start recording from any mode using the INSTANT REC button, even from rewind or fast forward, or from power off (as long as the power cord is plugged in).
- If the INSTANT REC button is pressed with a non-recordable cassette loaded (one with its safety tab removed), the cassette will be automatically ejected.
- If you want to perform instant recording after you have set the timer and pressed the TIMER button to ON, press the INSTANT REC button as usual. Power will be turned on and instant recording will start. After instant recording has been performed, the Timer mode is automatically re-entered and power is turned off. The preset time for instant recording has priority over the programmed preset times. Before pressing the INSTANT REC button, make sure that the instant recording time will not eventually overlap the programmed preset times.
- If the programmed switch-on time for a timer recording should come after the switch-off time of the instant recording, this timer recording will still be made automatically.

RECORDING WITH A VIDEO CAMERA


TV receiver
VHS
OPERATE
SUN
CLOCK
12:30
COUNT
0001
SHUTTLE SEARCH
REW
PLAY
FF
REC
STOP
PAUSE STILL
EJECT
SLOW
INSTANT REC
COUNTER
CAMERA

2 Switch ON.
- Adjust the TV receiver's channel to your video channel.

5 Press REC and PLAY simultaneously.
- The recorder enters the Recording Standby mode. Starting or stopping of the tape is remote-controlled by the camera's on/off switch; pressing the REC and PLAY buttons will not start the tape running.

3 Load a cassette.

7 To end recording, press STOP.

to CAMERA connector (on rear panel)

1 Connect a video camera.
- First make connections. Then power ON.

4 Set to CAMERA.

6 Operate the camera's start/stop switch.
- Now recording will start.

Notes:
- If feedback noise (whistling or howling) is heard from the TV receiver, reduce the volume or move the microphone, being used, farther away from the TV receiver.
- For camera operation refer to the instruction manual for the relevant camera.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

Symptoms	Check points
No power is applied to the HR-D250E.	● Is the power cord disconnected? Connect it.
Playback picture does not appear while the tape is running.	● Is the TV receiver's channel selector set to an occupied channel? Set to the RF converter channel.
Tape does not run in the Record mode.	● Is the PAUSE/STILL button pressed? Press PLAY to release.
REC button cannot be engaged.	● Is the cassette improperly loaded? Load it properly. ● Is the safety tab broken? Reseal the slot.
Tape stops in the Rewind or Fast Forward mode.	● Is the COUNTER MEMORY button set to ON? Set to OFF.
Tape will not rewind.	● Is the tape already rewound to the end?
TV broadcasts cannot be recorded.	● Is the TV/AUX/CAMERA switch set to AUX or CAMERA? Set to TV.
Noisy playback picture.	● Adjust with the TRACKING control. Return the control to its centre position after playing back the particular tape.
Noise appears during slow-motion playback.	● Adjust the SLOW ADJUST control.
Pressing PAUSE/STILL during still playback brings a still picture (in a frame-by-frame manner) with noise bars.	● Noise bars can be eliminated by pressing the PAUSE/STILL button a few more times. Or, engage the Slow mode, turn SLOW ADJUST, then return to the Still mode.

This recorder contains microcomputers. External electronic noise or interference could cause malfunctioning. In such cases, switch the power off and unplug the power cord. Then plug it in again and check the functions.

HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the video heads after long periods of use causes such problems. In this case, head cleaning requiring highly technical care is necessary.

For head cleaning, consult the nearest JVC Dealer.

SPECIFICATIONS

Format : VHS PAL standard
Recording system : Rotary, slant azimuth two-head helical scan system
Video signal system : PAL colour and CCIR monochrome signals, 625 lines
Tape width : 12.65 mm
Playing time : 240 minutes with E-240 video cassette
Temperature
  Operating : 5°C to 40°C
  Storage : -20°C to 60°C
Channel coverage : VHF BAND I, 47 – 111 MHz
VHF BAND III, 111 – 300 MHz
UHF BAND IV/V, 470 – 862 MHz
Aerial output : UHF channels 32 – 40 (adjustable)
Power consumption : 30 watts (50 watts with camera)
Power requirement : 220 V∿, 50/60 Hz
Video
  Input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
  Output : 1.0 Vp-p, 75 ohms unbalanced
  Signal-to-noise ratio : 43 dB (Rohde & Schwarz noise meter) with PICTURE SHARPNESS control at centre position
  Horizontal resolution : More than 250 lines with PICTURE SHARPNESS control at centre position
Audio
  Input : Line: -20 dBs
50 k-ohms unbalanced
  Output level : -6 dBs, high impedance load
  Output impedance : Less than 1 k-ohm, unbalanced
  Signal-to-noise ratio : More than 40 dB
  Frequency range : 70 Hz to 10,000 Hz
Timer : 14-day/4-programme timer
Dimensions : 435 mm(W) x 95 mm(H) x 376 mm(D)
Weight : 7.6 kg
Provided accessories : Aerial cable, Video cassette tape, Infrared remote control unit, "R6" battery x 2

Design and specifications subject to change without notice.

INSTRUCTIONS: STEREO VIDEO CASSETTE RECORDER

For refernce, the text of the Instruction booklet for this model is reproduced in the following pages.

Numbering of the pages also corresponds with that of the booklet.

The Instructions shown pertain specifically to the Model HR-D250E. For detailed descriptions, be sure to consult the Instruction booklets of the other models.

Main differing points with respect to other models in this series (with suffixes E and EG) are aslo included.

The following table lists the principal differing points among the models (suffixes E, EG and EK) in this series.

Item \ Model		E	EG	EK
Power reguirement		220 V ∿, 50/60 Hz	←	240 V ∿, 50/60 Hz
TV-Tuner	VHF BAND I	47 – 111 MHz	←	–
	VHF BAND III	111 – 300 MHz	←	–
	UHF BAND IV/V	470 – 862 MHz	←	21 – 69 (channels)

NOTE: ← : Same as model at left

SECTION 1
GENERAL DESCRIPTION

1.1 GENERAL OUTLINE

The VHS system achieves very low tape consumption and uses low cost video cassette tape. Recording time in the standard mode has become 3 hours.

Increased recording time results from the narrow gap video heads, high sensitivity video tape and the slant azimuth recording head configuration which eliminates the need for a guard band between recorded tracks.
In addition, the VHS format takes into consideration special operating modes such as still picture, slow motion and speed playback. The design also allows switching over between the SECAM and NTSC television standards.

Adoption of the VHS format presented several technical challenges. Foremost among these were obtaining high picture quality and high resolution despite the slow (4.9 meters per second) relative speed between the tape and video heads, improving signal to noise ratio (S/N), and preventing black to white reversal phenomena due to the short recording wavelength of 1.0 μm. Also the $\pm 6^\circ$ azimuth angle of the video heads alone is not sufficient to eliminate crosstalk from the lowband converted color signal.

Steps for solving these difficulties included adoption of a nonlinear emphasis circuit and selecting the emphasis amount for optimum S/N. The reversal problem was overcome by using a double limiter circuit, while a phase shift system has been designed for eliminating color crosstalk.

The following discussion covers several main points of the VHS format.

1.2 MECHACON OPERATIONS

1.2.1 Power ON state

1. POWER LED lights.
2. Stop mode is entered.
3. In event of power interruption in a mode other than Stop, at the return of power, the Stop mode is entered (except for Timer standby).
4. Even with power OFF, pressing the INSTANT REC button enables recording.
5. Even with power OFF, pressing the EJECT button enables eject.
6. Even with power OFF, inserting the cassette produces power ON.

1.2.2 Cassette housing up/down

1. If housing up or down operation is not completed within approximately 8 seconds, the Emergency mode is entered and the power cut off.
2. If either the up or down position switches of the cassette housing assembly is open, at supply of power, the housing is raised.

1.2.3 Operating modes

1. Display indications are provided for the Play, Record, Fast Forward and Still/Pause modes. Compound indications are provided for the Still/Pause, and Search FF/REV modes. Indications are not provided for the Stop and Eject modes.
2. During the Play or Still mode, holding the SHUTTLE SEARCH FF (or REV) button depressed provides Search Forward (or Search Reverse) operation. Releasing the button returns the Play mode.
3. After the start of loading, if more than approximately 8 seconds elapse before completion of loading, the Emergency mode is entered and power cut off.
4. After completion of loading, if drum rotation remains stopped for longer than approximately 3 seconds, unloading is performed and the Stop mode is entered.
5. After the start of unloading, if more than approximately 8 seconds elapse before completion of unloading, the Emergency mode is entered and power cut off.
6. With the exception of Still/Pause, if the reels do not rotate for more than about 5 seconds, the Stop mode is entered.
7. If Still/Pause continues for longer than approximately 5 minutes, unloading is performed and the Stop mode is entered.

8. When the REC safety switch is open, the Recording mode (including Rec/Pause) is inhibited.

9. When the erase protector tab of the cassette is missing, pressing the INSTANT REC button yields Eject, then power OFF.

10. During Search Reverse, when the start sensor detects the leader tape, unloading is performed and the Stop mode is entered.

11. During Search Forward, when the end sensor detects the trailer tape, unloading is performed and the Auto Rewind mode is entered.

12. In the Stop or Rewind mode, if the start sensor detects the leader tape, FF is performed until the leader tape is no longer detected.

13. In the Stop or FF mode, if the end sensor detects the trailer tape, the Rewind mode is entered.

14. With the TAPE MEMORY switch set to COUNTER, when the tape counter reaches 0000 in the FF or REW mode, the Stop mode is entered.

15. The REMOTE PAUSE contacts are closed when not connected. When open (high) the REC Pause mode is entered.

1.2.4 TIMER button ON

1. With the TIMER button ON, the OPERATE button does not switch power ON.

2. Even when properly set up for timer recording, if the erase protector tab of the inserted cassette is missing, the cassette is ejected when the TIMER button is pressed.

3. During Play, Recording or Still mode, when the TIMER button is pressed, backspace is performed, then in the timer standby state, power is cut off.
Pressing the TIMER button to ON during REC/Pause yields timer standby and power is cut off.

4. In event of timer program input error, the TIMER inscription flashes for 10 seconds, then lights continuously.

1.2.5 Mode shift table

CURRENT MODE KEY OPERATION	STOP	PLAY	STILL	SLOW	FF	REW	REC PLAY	REC PAUSE	INSTANT REC	TIMER REC	CASSETTE EJECT
STOP		○	○	○	○	○	○	○	○	×	×
PLAY	○		○	○	○	○	×	○	×	×	×
STILL/PAUSE	×	○	○ (E.ADV)	○	×	×	○	×	×	×	×
SLOW + / −	×	○	○ (※1)	○	×	×	×	×	×	×	×
FF	○	○ (S.FF)	○ (S.FF)	○ (S.FF)		○	×	×	×	×	×
REW	○	○ (S.REW)	○ (S.REW)	○ (S.REW)	○		×	×	×	×	×
REC + PLAY	○	○	○	○	○	○		○	×	×	×
REC + PAUSE	○	○	○	○	○	○	○		×	×	×
EJECT	○	○	○	○	○	○	×	×	×	×	
INSTANT REC	○	○	○	○	○	○	○	○		○	×
CH UP/DOWN	○	×	×	×	○	○	×	○	×	×	○

※1 : SLOW SPEED CHANGE

SECTION 2
MECHANICAL ADJUSTMENTS

2.1 GENERAL

2.1.1 Precautions

- IMPORTANT

1. Disconnect from power before removing or soldering components.
2. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require re-adjustment.
3. Tighten the screws carefully to avoid damage to the chassis.

Test equipment required :

Color television or monitor
Oscilloscope : wide-band, dual trace, triggered, delayed sweep
Recording tape
Alignment tapes

2.1.2 Required jigs and tools

For proper mechanical adjustment, the following jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary, resulting in possible damage. In addition, general-purpose tools and a metric hex key (obtain locally) are required.

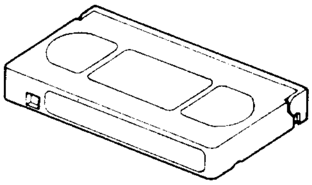
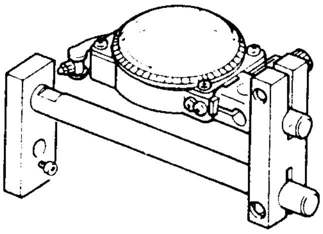
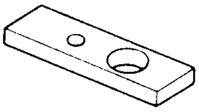
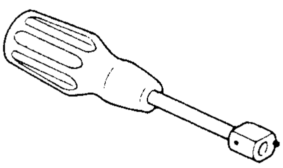
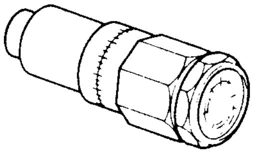
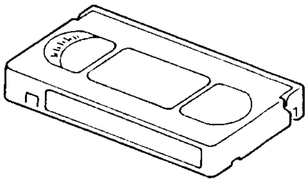
JVC alignment tape MH-2 	Micro-checker PUJ49712-2 	Spacer PUJ44905 (for micro-checker) 
A/CTL head position tool PUJ47351-2 	Torque gauge ass'y PUJ48075-2 (Torque meter : 600ATG Torque gauge head : PUJ48016-2) 	Back tension cassette gauge PUJ48076 

Table 2-1-1 Jigs and tools

2.1.3 Disassembly

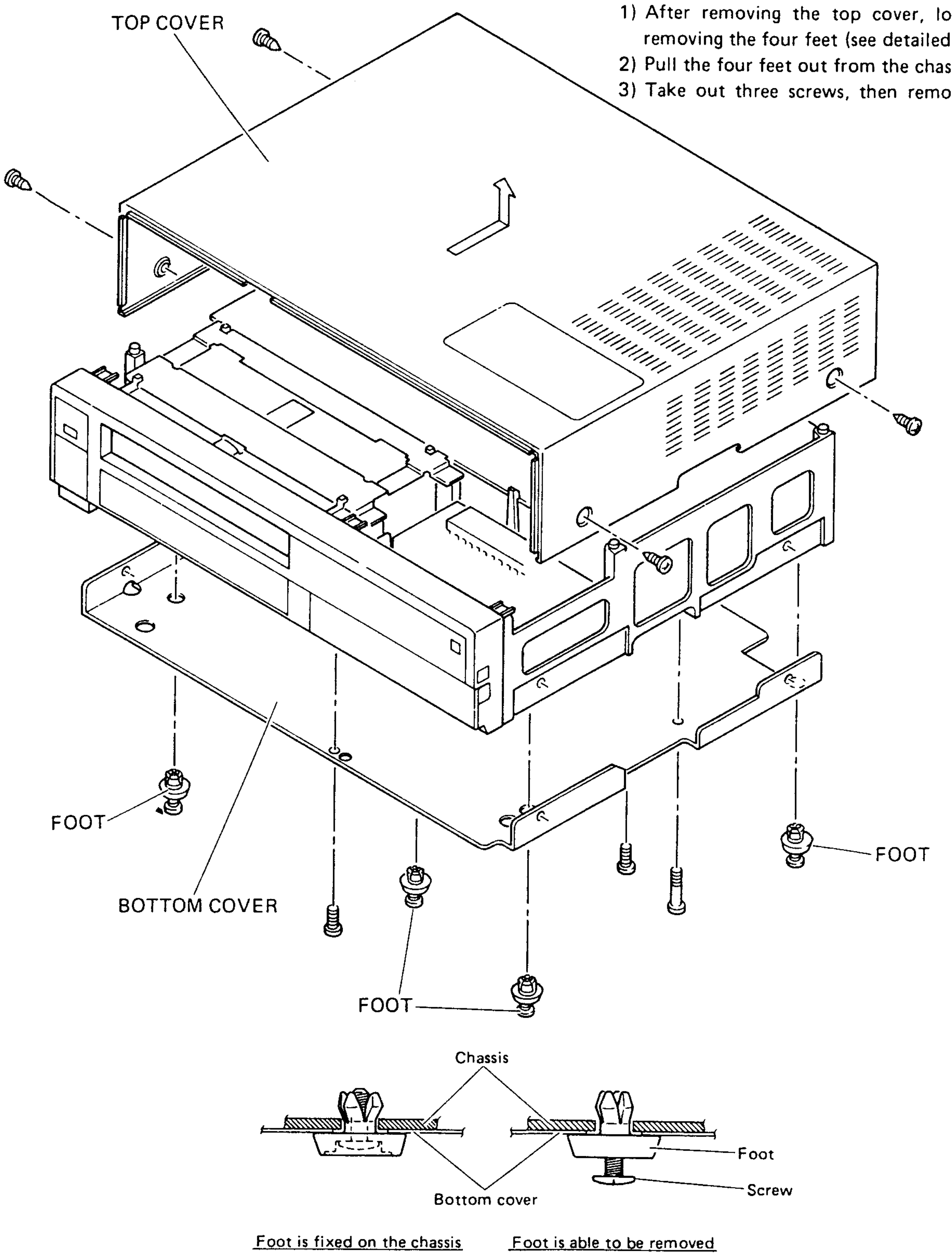
1. Top cover and bottom cover

– Top cover –

1) Take out four screws, then remove the top cover in the arrow direction.

– Bottom cover –

1) After removing the top cover, loosen four screws for removing the four feet (see detailed figure).
2) Pull the four feet out from the chassis.
3) Take out three screws, then remove the bottom cover.


TOP COVER
FOOT
BOTTOM COVER
FOOT
FOOT
FOOT
Chassis
Foot
Screw
Bottom cover

Foot is fixed on the chassis

Foot is able to be removed

Fig. 2-1-1 Top cover/bottom cover

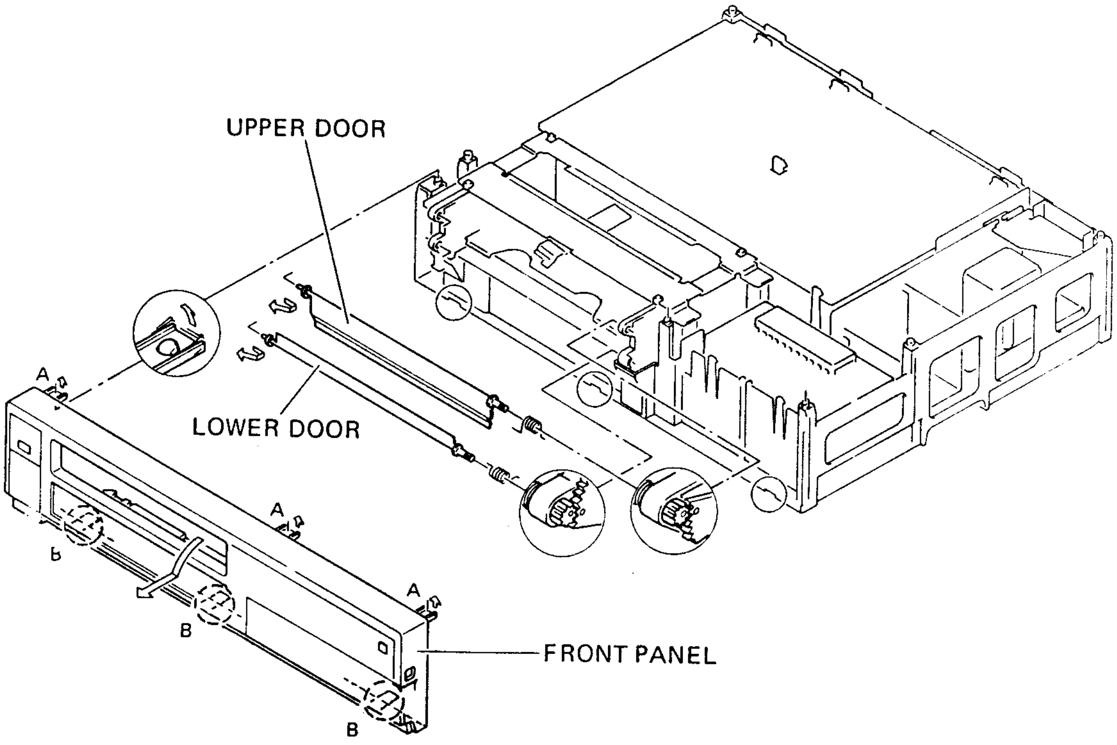
2. Front panel and cassette doors

– Front panel –

1) After removing the top cover, bend three points A of the front panel upwards to disengage them from the chassis, then pull the front panel outwards.
2) Disengage three points B of the front panel from the chassis for removing the front panel.

– Cassette doors –

1) Move the lower door fully to the right, then disengage the left end of the lower door from the cassette housing.
2) Pull the lower door out to the left. Use care regarding the torsion spring.
3) Remove the upper door in the same manner as the lower door.



Notes:

When reassembling the doors, proceed as follows:

1) Locate the mark on the gear portion of the upper door.
2) Set the long straight part of the torsion spring toward the upper door.
3) Install the upper door so that the mark noted in Step 1) is aligned with the mark on the upper door opener of the cassette housing.
4) Install the lower door in the same manner as the upper door.

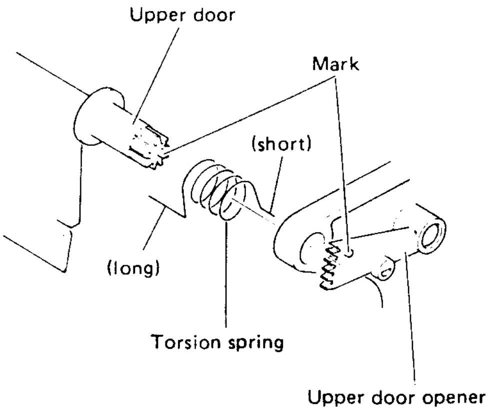


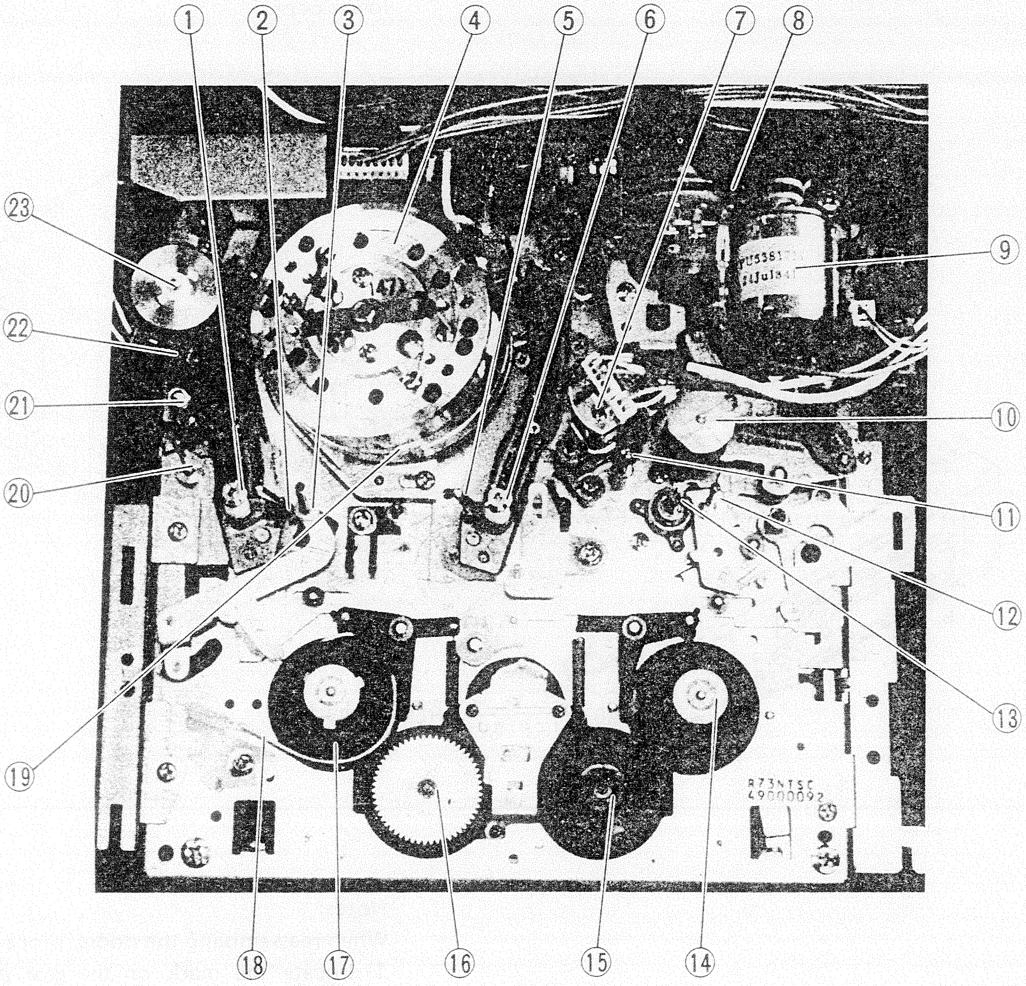
Fig. 2-1-2 Front panel/cassette doors

2.2 PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

2.2.1 Layout of maintenance parts

1. Top view


①
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R73NTSC
49000092

Fig. 2-2-1 Top view

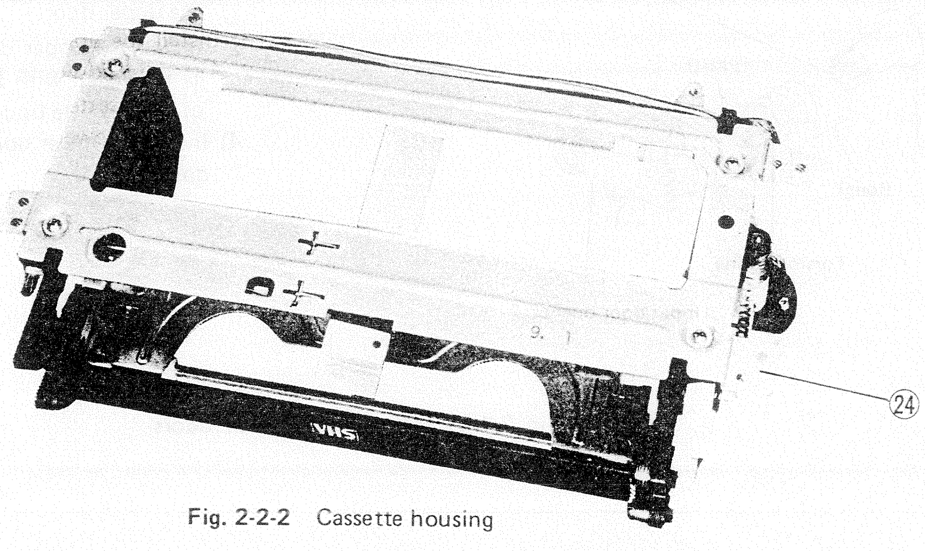


Fig. 2-2-2 Cassette housing

2. Bottom view

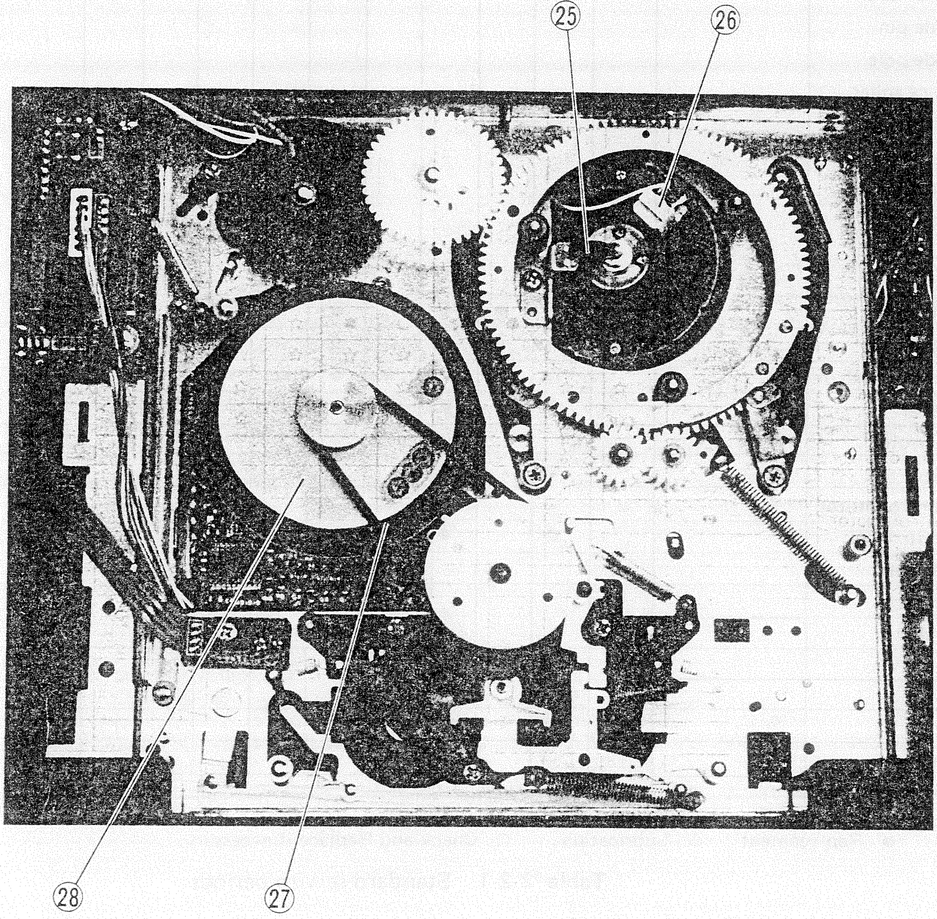


Fig. 2-2-3 Bottom view

1 SUP guide roller
2 SUP slant pole
3 Tension pole
4 Upper drum
5 T.U. slant pole
6 T.U. guide roller
7 Audio/Control head
8 Motor control belt
9 Mode control motor
10 Pinch roller
11 T.U. guide pole
12 Guide arm
13 Capstan
14 T.U. reel disk
15 T.U. clutch
16 SUP clutch
17 SUP reel disk
18 Tension band
19 Lower drum
20 SUP guide pin
21 SUP guide pole
22 Full erase head
23 Impedance roller
24 Cassette motor
25 Brush
26 Pick-up head
27 Reel belt
28 Capstan motor

T.U. : Take-up
SUP : Supply

2.2.2 Service schedule for main components

The following table lists the parts which should receive periodic servicing at the recommended intervals.

	Part Name	Replacement Part No.	Periodic Service Schedule (Operating Hours)										Reference Section	Remarks
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000		
Tape transport system	Tension pole SUP slant pole SUP guide roller SUP guide pin SUP guide pole Impedance roller TU guide pole Capstan Guide arm TU guide roller TU slant pole Lower drum		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆		• For cleaning, use a lint-free cloth or gauze dampened with alcohol. • After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.
	Upper drum		☆	○	●	☆	○	●	☆	○	●	☆	2.3.2	— When cleaning the head tips on the upper drum, do not clean them with a vertical stroke. Use only a gentle back and forth motion in the direction of the tape path.
	Full erase head		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2.3.3	
	Audio/control head		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2.3.4	
	Pinch roller		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2.3.5	
Drive system	Capstan motor											○	2.3.6	
	Reel belt			☆		●		☆		●		☆		
	Mode control motor											○	2.3.7	
	Mode control belt			☆		●		☆		●		☆		
	Cassette motor											○	2.3.8	
	SUP reel disk TU reel disk					△				△		○	2.3.9	— Do not over lubricate.
	TU clutch SUP clutch			○		○		○		○		○	2.3.10	— Torque check (refer to section 2.4.3).
Others	Brush		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2.3.11	
	Tension band			○		○		○		○		○	2.3.12	— Back tension check (refer to section 2.4.4)
	Pick-up head												2.3.13	

☆ Cleaning ● Replacement △ Lubrication ○ Check and Replace if necessary.

Table 2-2-1 Standard service periods

Above replacement times will vary greatly according to environmental and usage conditions. Routine inspection and maintenance are also important factors that influence the unit life. Note that rubber parts may become aged or deformed after long periods of storage, even if the unit is not used.

Note: Even if the unit is not used frequently, cleaning, lubrication and replacement of the belts should be undertaken every 2 years.

2.3 MAIN ASSEMBLY REPLACEMENT

Remove the external covers and the circuit boards, as necessary, to allow replacement.

2.3.1 Cassette housing

- Removal of cassette housing

1. Take out screws ① and disengage the two stoppers from MAIN board, then raise MAIN board upwards.
2. Disconnect connector CN1, coming from the MAIN board, from the CASS. HOUSING board.
3. Take out four screws ② and remove the earth plate.
4. Carefully lift the cassette housing upwards to remove it.

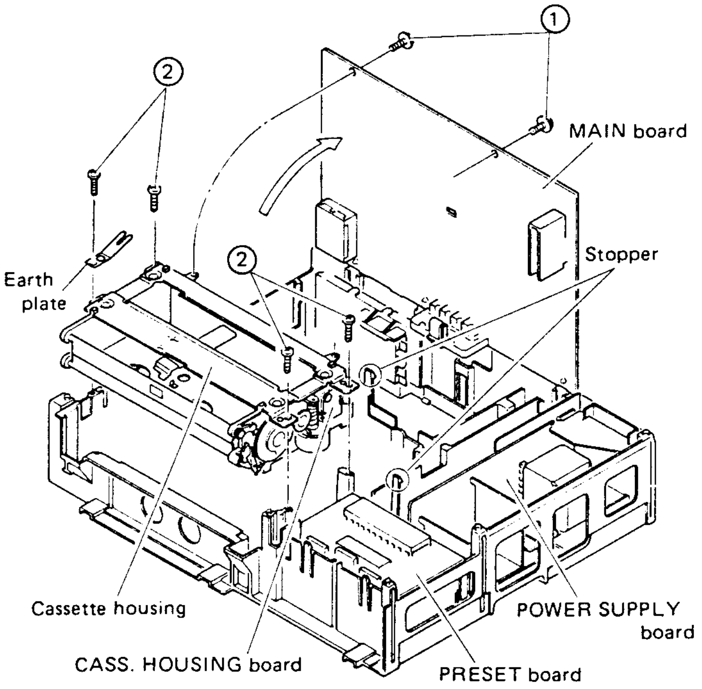


Fig. 2-3-1 Removal of cassette housing

- How to operate the set without loading a tape cassette

For service procedures that call for operation of the set without loading the tape around the head drum, extract the cassette housing from the interior of the set and position it as described below.

1. Set a sheet of insulated material (cardboard, plastics, etc.) on the right side of chassis, above the PRESET and POWER SUPPLY boards.
2. Remove the cassette housing from the interior of the set and place it on the insulated sheeting, but do not disconnect the connector from the MAIN board.
3. Insert a cassette into the cassette housing. The housing mechanism functions to retract the cassette.

Notes:

1) To prevent alignment tape from miss-erasure, insert the cassette without safety tab into the cassette housing.
2) Confirm that the cassette is not at tape end or tape start position.

4. Since the required sensors are contained within the housing, after the cassette has been retracted, the desired modes can then be obtained by using the operation switches.

2.3.2 Upper drum

1. Unsolder the eight wires connecting the lower drum from the relay pins of the upper drum (perform quickly to avoid damaging the wires by overheating).

RELAY PIN COLOR	CHANNEL	INNER/OUTER
Brown	SP, CH-1	Brown/Green
Red	SP, CH-2	Red/White (Clear)
Blue	EP, CH-1	Blue/Black
Orange	EP, CH-2	Orange/Yellow

Table 2-3-1 Upper drum wiring

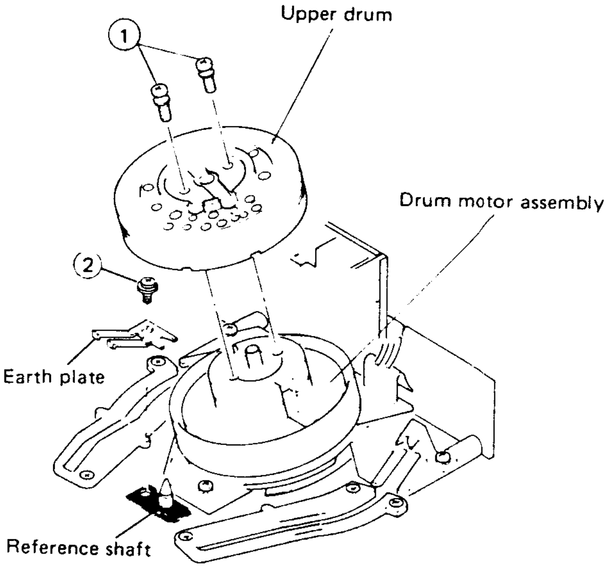


Fig. 2-3-2 Upper drum replacement

2. Take out two screws ① and remove the upper drum in the upward direction.
3. Use alcohol to clean the lower face of the new upper drum and the upper face of the lower drum. When handling and installing the new upper drum, avoid directly touching the head tips and use care not to scratch the drum.
4. Reassemble by reversing the above steps. When resoldering, observe the correct channels (refer to Table 2-3-1) and avoid overheating the wires.

5. Perform the upper drum eccentricity adjustment.
   1) Supply power and set for the Play mode without a cassette housing (refer to section 2.3.1). After completion of loading, disconnect from power.
   2) Take out screw ② and remove the earth plate as shown in Fig. 2-3-2.
   3) Set the micro-checker on the reference shaft as shown in Fig. 2-3-3. Use a hex wrench (metric) to tighten the mounting screw.

Caution: The micro-checker is a test fixture for measuring eccentricity of the upper drum.
When using this fixture, observe the following precautions.

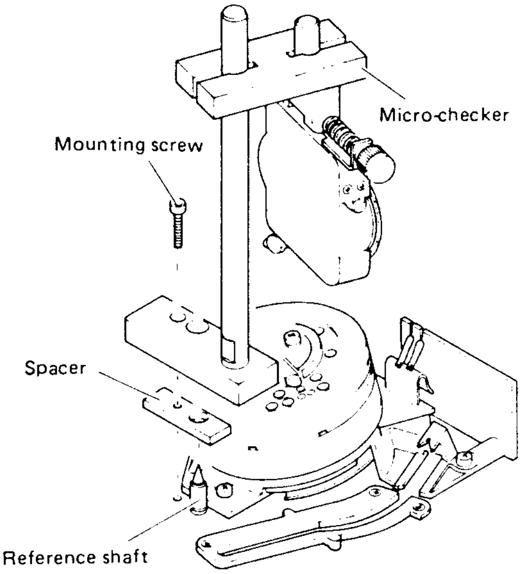


Fig. 2-3-3 Micro-checker mounting

- **As the instrument is extremely precise, use special care not to drop it or subject it to strong vibration.**
- Do not apply strong force to the test probe.
- The outer frame of the scale can be turned about 7 scale divisions. Do not turn it forcibly (force greater than 300 g-cm).
- **Use care that the test fixture does not contact the video heads.**
- Before mounting, turn the fine adjust knob counter clockwise (to where the spring tension is no longer felt).
- **Do not apply power while the test fixture is installed.**

   4) Check and readjust the micro-checker position. The correct position is achieved when:
   - The test probe contact point is 2 or 3 mm under the top surface of the upper drum.
   - The test probe movement direction is toward the center portion of the upper drum.
   5) Gradually turn the fine adjust knob clockwise so that the test probe contacts the upper drum. The dial indicator registers zero on the scale.
   6) While using care not to apply lateral pressure to the upper drum, slowly turn the upper drum and read the deviations indicated by the micro-checker.

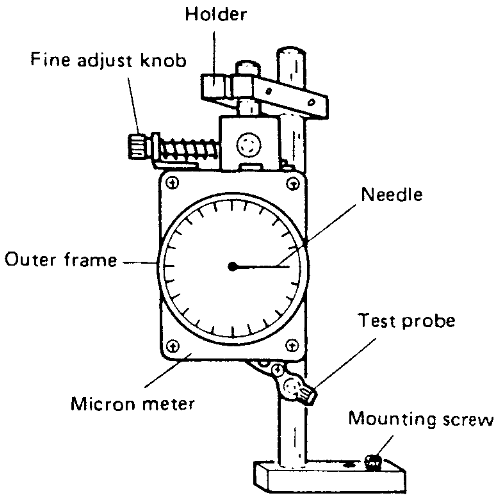


Fig. 2-3-4 Micro-checker

   7) Check for needle deflection within 4 microns.
   8) If deviation is greater than 4 microns, after turning the fine adjust knob counterclockwise to disengage the test probe from the upper drum, loosen two screws ① and carefully readjust the upper drum position, then retighten the two screws in a balanced manner. Repeat above steps 4) to 6).
   9) After using, turn the fine adjust knob counterclockwise and remove the micro-checker.
   10) After reinstalling the earth plate, supply power and set for the Stop mode.

6. Perform the interchangeability adjustment (refer to section 2.4.6).

2.3.3 Full erase head

1. Disconnect the connector CN1 from the full erase head.
2. Take out screw ① and remove the full erase head from the erase head arm.
3. Replace the full erase head and reassemble by reversing the above steps.

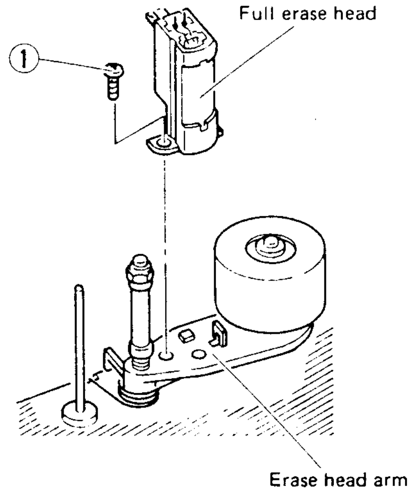


Fig. 2-3-5 Replacement of F.E. head

2.3.4 Audio/control head

1. Disconnect connectors CN1 and CN2 from the A/CTL HEAD board.
2. Take out screws ① and remove the audio/control head with the head base.

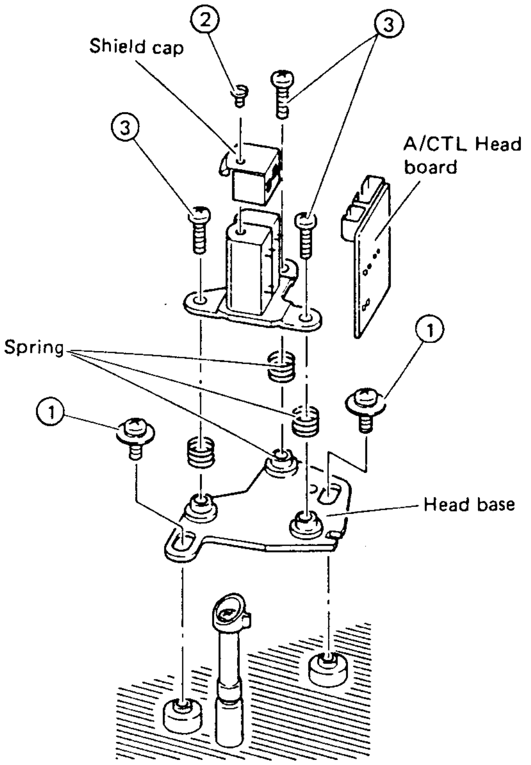

②
③
Shield cap
③
A/CTL Head board
Spring
①
①
Head base

Fig. 2-3-6 Replacement of A/CTL head

3. Unsolder the six terminals coming from the heads and remove the A/CTL HEAD board.
4. Take out screw ② and remove the shield cap from the audio/control head.
5. Take out screws ③ to separate the audio/control head from the head base. Use care regarding springs.
6. Replace the audio/control head and reassemble by reversing the above steps. Before mounting on the main-deck, perform rough-adjustment of audio/control head height as shown in Fig. 2-3-7.

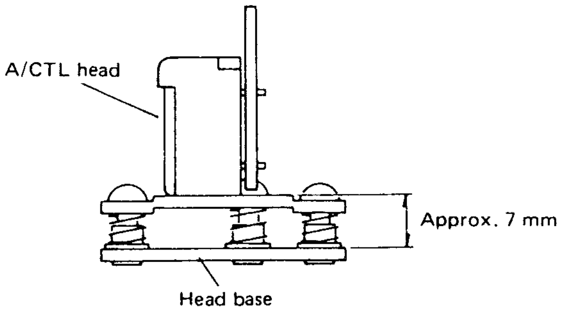

A/CTL head
Approx. 7 mm
Head base

Fig. 2-3-7 A/CTL head height

7. Perform the tape transport/interchangeability checks and adjustments (refer to sections 2.4.5 and 2.4.6).

2.3.5 Pinch roller

1. Take out slit washer ① and slit washer ②, and remove the pinch roller arm in the upward direction.
2. After cleaning the pinch shaft, spread grease on it.
3. Replace the pinch roller arm and reassemble by reversing the above steps. Avoid staining the pinch roller with grease.

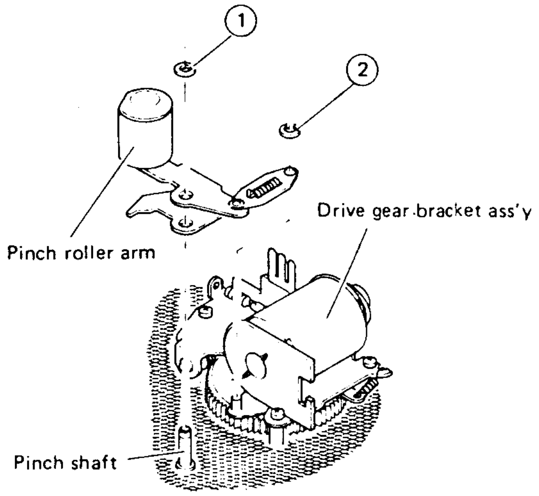

①
②
Drive gear bracket ass'y
Pinch roller arm
Pinch shaft

Fig. 2-3-8 Replacement of pinch roller

2.3.6 Capstan motor

1. Take out slit washer ① and remove the guide arm with spring.
2. Disconnect connector CN3 from the DECK TERMINAL board.

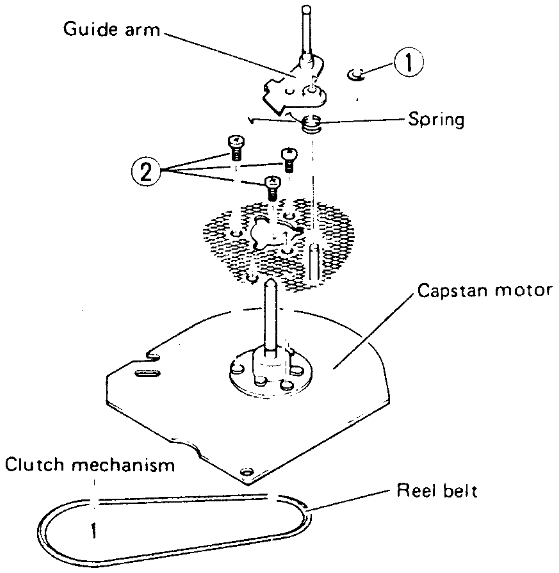

Guide arm
①
Spring
②
Capstan motor
Clutch mechanism
Reel belt

Fig. 2-3-9 Replacement of capstan motor

3. Disengage the reel belt from the capstan motor and the pulley of the clutch mechanism assembly.
4. Take out three screws ② and remove the capstan motor in the downward direction. Use care regarding the motor brake.
5. Replace the capstan motor and reassemble by reversing the above steps.

2.3.7 Mode control motor

1. Take out screws ①, ② and ③ to free the main deck from the chassis.
2. Disengage the mode control belt from the motor pulley.
3. Disconnect connector CN1 from the MOTOR board. Take out screws ④ and ⑤, then remove the mode control motor.
4. Unsolder the mode control motor from the MOTOR board and replace.
5. Observe motor polarity (+ side upward) and reassemble by reversing the above steps.

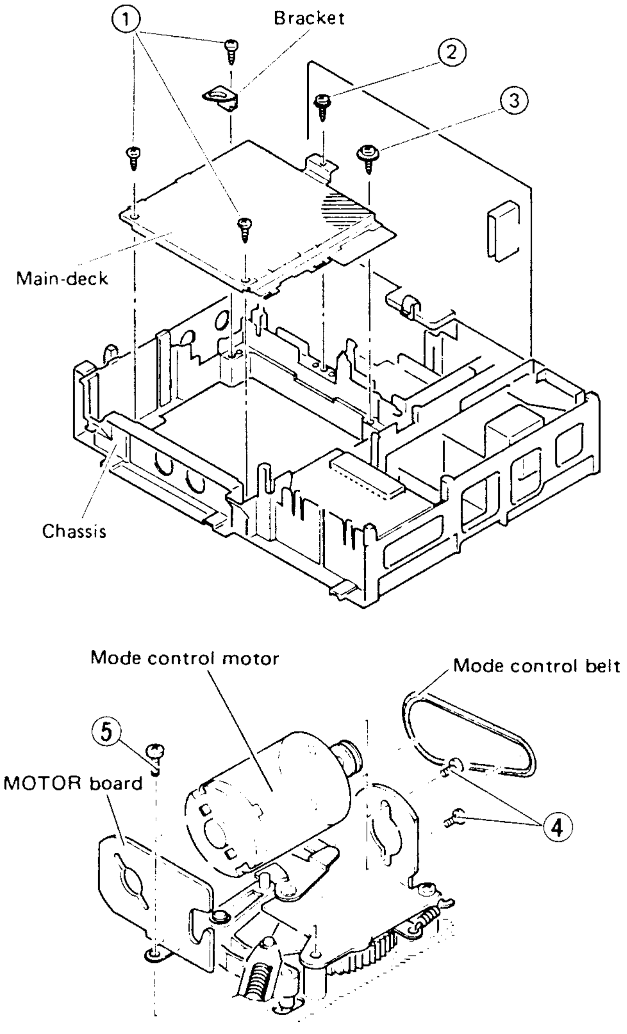


Fig. 2-3-10 Removal of mode control motor

2.3.8 Cassette motor

1. Remove the cassette housing (refer to section 2.3.1).
2. Unsolder the two wires from the cassette motor.

DISTINCTION	WIRE COLOR
Thick boss Thin boss	White Gray

Table 2-3-2 Cassette motor wiring

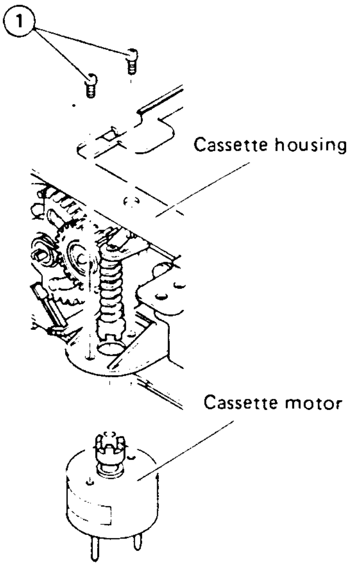


Fig. 2-3-11 Replacement of cassette motor

3. Take out two screws ① and remove the cassette motor.
4. Replace the cassette motor and reassemble by reversing the above steps. Use care regarding the motor wire polarity (refer to Table 2-3-2).
5. Reinstall the cassette housing into its original position.

2.3.9 Reel disks

- Supply reel disk

1. Take out slit washer ① and remove the supply loading brake with spring.
2. Disengage the tension band holder from the tension arm and move the tension band to the side.
3. Take out slit washer ② and remove the supply reel disk upwards. Use care regarding the washers.
4. After cleaning the reel shaft with alcohol, lubricate it with one drop of sewing machine oil. Do not over lubricate.
5. Replace the supply reel disk and reassemble by reversing the above steps.
6. Perform the back tension check (refer to section 2.4.4).

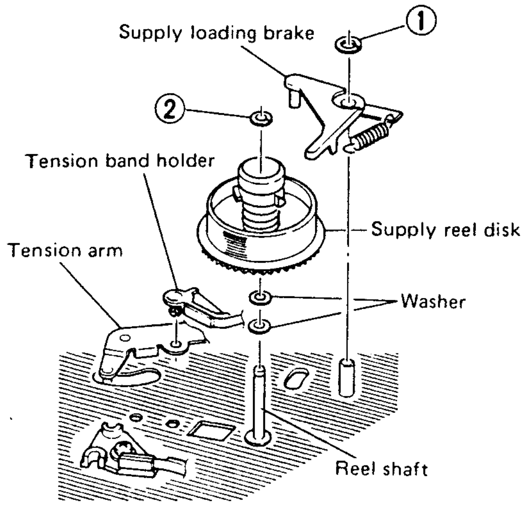

Supply loading brake
①
②
Tension band holder
Supply reel disk
Tension arm
Washer
Reel shaft

Fig. 2-3-12 Replacement of supply reel disk

- Take-up reel disk

1. Take out slit washer ① and remove the take-up reel disk upwards while moving the take-up loading brake. Use care regarding the washers.
2. After cleaning the reel shaft with alcohol, lubricate it with one drop of sewing machine oil. Do not over lubricate.
3. Replace the take-up reel disk and reassemble by reversing the above steps.

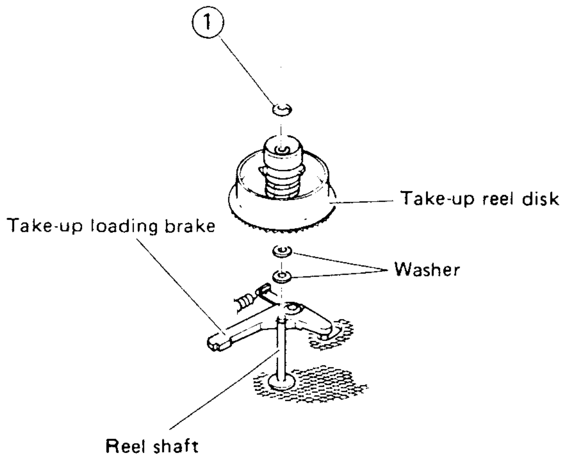

①
Take-up reel disk
Take-up loading brake
Washer
Reel shaft

Fig. 2-3-13 Replacement of take-up reel disk

2.3.10 Clutch mechanism

- Take-up and Supply clutches

1. Remove the take-up reel disk (refer to section 2.3.9).
2. Take out slit washer ①, then remove the take-up clutch while shifting the take-up main brake. Use care regarding the washer under the clutch.
3. Clean the clutch shaft with alcohol, then lubricate it with one drop of sewing machine oil. Do not over lubricate.
4. Replace the take-up clutch and reassemble by reversing the above steps.
5. In the same manner, remove the supply reel disk and replace the supply clutch.
6. Perform the take-up torque check (refer to section 2.4.3).

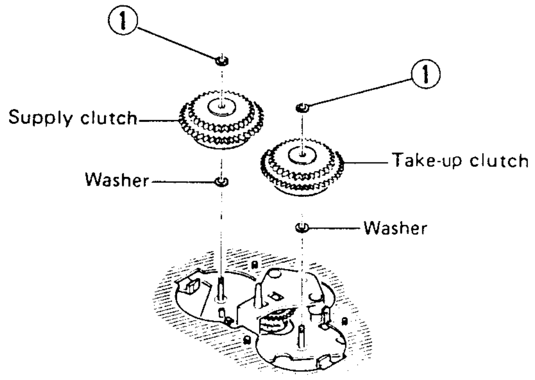

①
①
Supply clutch
Take-up clutch
Washer
Washer

Fig. 2-3-14 Replacement of clutches

- Clutch mechanism

1. Disengage the five springs from the clutch mechanism. These springs come from the supply loading brake, take-up loading brake, main brake slider, supply main brake and take-up main brake.
2. Disengage the reel belt from the pulley of the clutch mechanism.
3. Take out screw ① and remove the clutch mechanism.

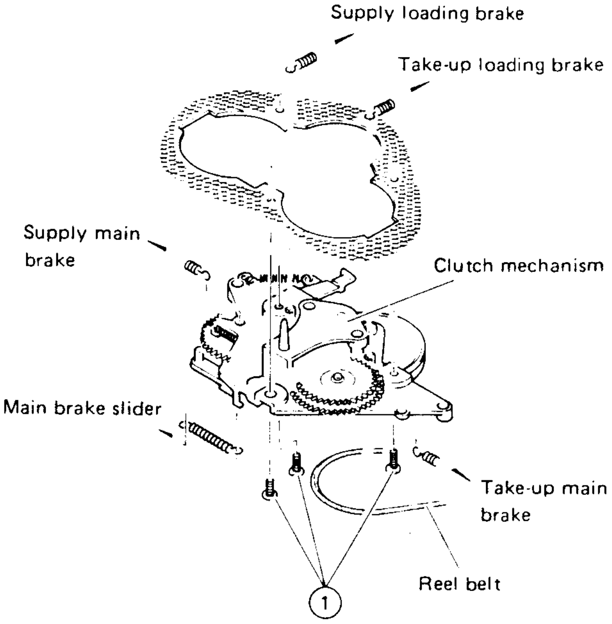

Supply loading brake
Take-up loading brake
Supply main brake
Clutch mechanism
Main brake slider
Take-up main brake
Reel belt
①

Fig. 2-3-15 Replacement of clutch mechanism

4. Replace the clutch mechanism and reassemble by reversing the above steps.
5. Perform the take-up torque check (refer to section 2.4.3).

2.3.11 Brush

1. Take out screw ① and remove the brush, and clean the commutator with alcohol.
2. Replace and install the brush as before, check that the brush contacts the center of the commutator.

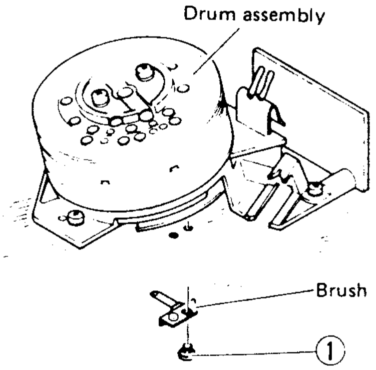


Fig. 2-3-16 Replacement of brush

2.3.12 Tension band

1. Take out slit washer ① and remove the supply loading brake with spring.
2. Take out screw ② and disengage the tension band from the tension arm, then replace the tension band.

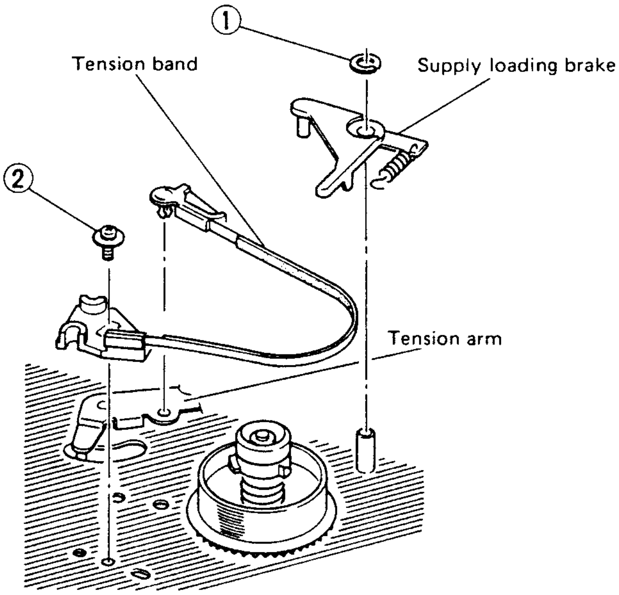


Fig. 2-3-17 Replacement of tension band

3. Reassemble the tension band by reversing the above steps.
4. Perform the tension pole position check and the back tension check (refer to sections 2.4.2 and 2.4.4).

2.3.13 Pick-up head

1. Unsolder the two wires from the terminals of the pick-up head.
2. Take out screw ① and remove the pick-up head.
3. Replace and reassemble the pick-up head by reversing the above steps. Use care regarding the wire polarity. Check that the pick-up head is toward the center position of the drum shaft.

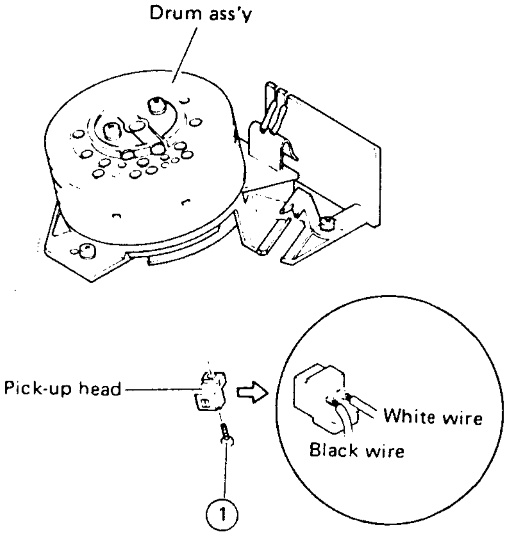


Fig. 2-3-18 Replacement of pick-up head

2.4 CHECKS AND ADJUSTMENTS

2.4.1 Mechanism timing check

- Loading rings and loading gear (2)

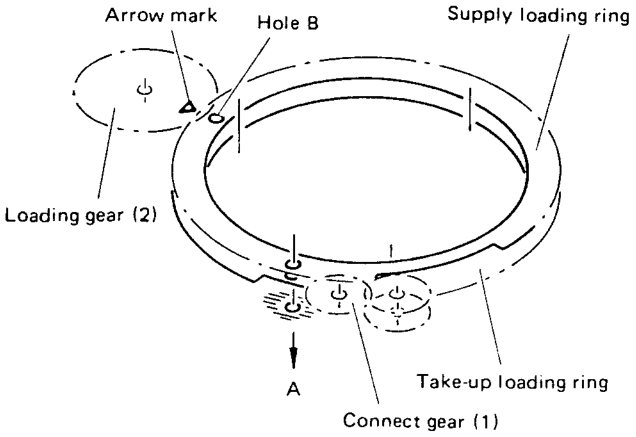


Fig. 2-4-1 Loading ring/loading gear (2)

1. Confirm that the two holes of supply and take-up loading rings are overlapped through the hole of the main-deck (arrow A in Figure). If a discrepancy is noted, after removing the connect gear (1), adjust the loading rings to obtain the correct position. Holes are overlapped in the Stop (FF/REW) mode position.
2. At the same time, confirm that the arrow mark of the loading gear (2) corresponds with hole B of the supply loading ring. If a discrepancy is noted, remove and re-install the loading gear (2) to obtain the correct position.

- Cam gear (drive gear bracket) and loading gear (1)

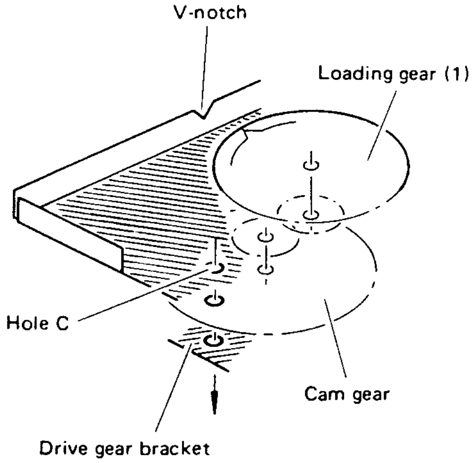


Fig. 2-4-2 Cam gear/loading gear (1)

1. When the two holes of cam gear and drive gear bracket are overlapped through the hole C of the main-deck (FF/REW mode position), confirm that the arrow indication of loading gear (1) is aligned with the V-notch of the main-deck. If a discrepancy is noted, remove and re-install the loading gear (1) to obtain the correct position.

2.4.2 Tension pole position check

1. Without loading a tape, set for the Play mode (refer to section 2.3.1).
2. Confirm that the center of the tension pole lies upon the left side of the supply guide pin bushing as shown in Fig. 2-4-3.
3. If necessary, loosen screw ① and adjust the tension band holder to obtain the correct tension pole position.

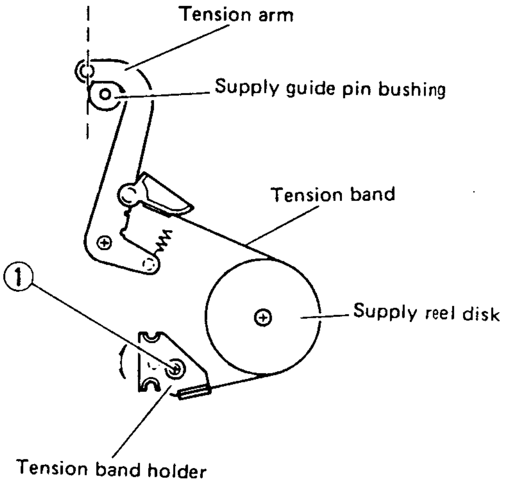


Fig. 2-4-3 Tension pole position

2.4.3 Take-up torque check

1. Set the Play mode without loading a tape (refer to section 2.3.1).
2. Set the torque gauge on the take-up reel disk.
3. The torque gauge consists of upper and lower sections connected by a spring mechanism. Relax the grip on the torque gauge so that the indicator needle and scale rotate at equal speed, then read the indication. The correct value is between 60 and 100 gf-cm.
4. If not the correct value, replace the take-up and supply clutches.

2.4.4 Back tension check

1. Use the back tension cassette gauge and set for the Play mode.
2. Confirm that the indication is between 11 and 19.
3. If not the correct value, check the tension pole position (refer to section 2.4.2) and the condition of the spring between tension arm and main-deck and replace the tension band (refer to section 2.3.12).
4. If necessary, also replace the supply reel disk (refer to section 2.3.9).

2.4.5 Tape transport system checks and adjustments

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following check is therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

- Tape transport checks

1. Use a 180-minute tape and check at the tape beginning and ending portion according to the following steps.

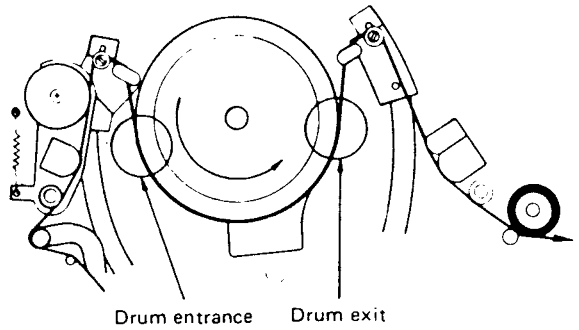
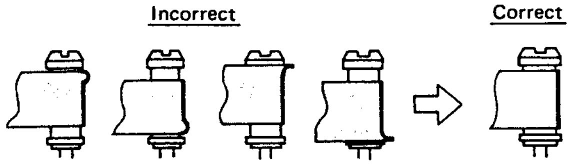
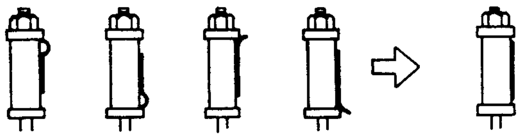


Fig. 2-4-4 Drum entrance/exit

1) During Play mode, observe tape at the entrance and exit portions of the drum lead.
Confirm that the tape slips neither upward nor downward with respect to the lead.



(a) Guide roller



(b) Guide pole

Fig. 2-4-5 Guide roller/guide pole

2) If defects are noted during the above check, perform the guide roller height adjustment.
3) During Play mode, observe the tape at the take-up and supply guide poles and guide rollers.
Confirm absence of curling, wrinkling, etc.
4) If defects are noted during the above check, perform the supply guide pole height and A/CTL head inclination adjustments.

2. At the ending portion of the recorded 180-minute tape, observe the tape during the Search Rev. (9 times speed) mode.
1) Confirm absence of curling, wrinkling, slipping, etc. at the take-up guide pole.
2) If defects are noted during the above checks, investigate the pinch roller.

3. Perform the interchangeability checks and adjustment (refer to section 2.4.6).

- Guide roller height adjustment

1. Slightly loosen setscrew under the guide roller of the pole base.
2. Use a cassette tape and set for the Play mode.
3. With a screwdriver, slightly turn the guide roller so that the tape travels smoothly in the drum lead without slipping upwards or downwards.

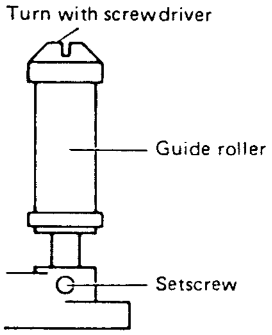


Fig. 2-4-6 Guide roller height adjustment

Notes:

1) Loosen the setscrew only enough to allow the guide roller to be turned.
If excessively loose, tape motion may turn the roller inadvertently.
2) Turn the roller carefully to avoid damage to the tape.

- Supply guide pole height adjustment

1. Use a cassette tape and set for the Play mode.
2. Use a metric nutdriver to turn the nut to align the tape lower edge with the upper face of the supply guide pole lower flange.

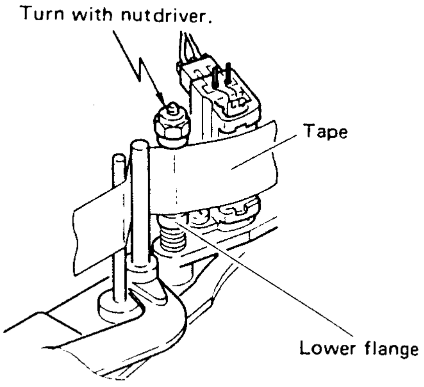


Fig. 2-4-7 Height of supply guide pole

- Audio/control head inclination

1. Use a cassette tape and set for the Play mode.
2. Turn audio/control head screw ① and align the tape lower edge with the upper face of the take-up guide pole lower flange.

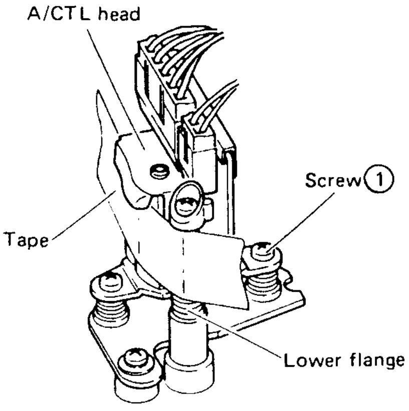


Fig. 2-4-8 Inclination of A/CTL head

Note: Take-up guide pole height is unable to be adjusted.

2.4.6 Interchangeability checks and adjustments

Before using an alignment tape, use a regular tape and confirm correct tape transport operation.

- Preliminary checks and adjustments

1. Connect an oscilloscope to TP6 (PB FM) of the MAIN board. Trigger the oscilloscope externally with the signal from TP411 (DRUM F.F.) of the MAIN board.
2. Play the alignment tape (stairstep signal) MH-2.

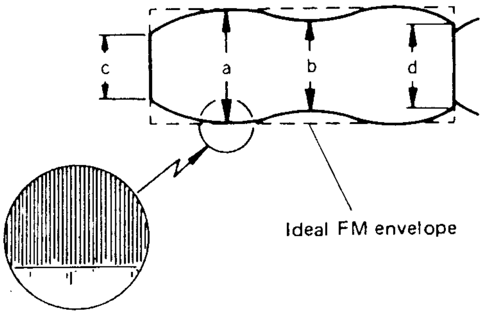


Fig. 2-4-9 FM waveform (max. output)

1) Turn the TRACKING knob to obtain the maximum FM output.
   Observe the FM waveform, read the maximum level (a) and the minimum levels (b), (c) and (d). Confirm that:

$$\frac{b}{a} \geqq 0.7, \frac{c}{a} \geqq 0.5 \text{ and } \frac{d}{a} \geqq 0.5$$

Note: If the waveform is serrated, read the value at the most uniform serrations.

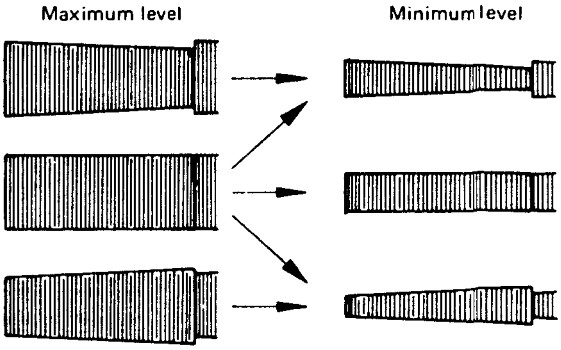


Fig. 2-4-10 Normal waveform examples

2) Turn the TRACKING knob to vary the FM output from maximum to minimum.
   Confirm that the waveform variation is nearly parallel.
3) If the above checks yield normal results, proceed to the audio/control head adjustments.
   If defects are noted, perform the following adjustments.

3. Loosen the setscrews of the supply and take-up guide rollers. If the guide rollers turn freely, slightly re-tighten the setscrews.
4. Play the alignment tape (stairstep signal) MH-2.
5. Observe the oscilloscope display and adjust the TRACKING knob for maximum FM output.

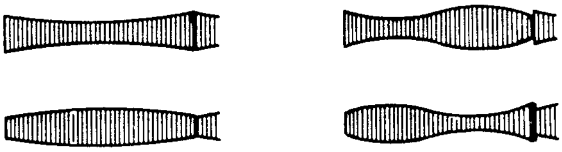


Fig. 2-4-11 Incorrect waveform examples

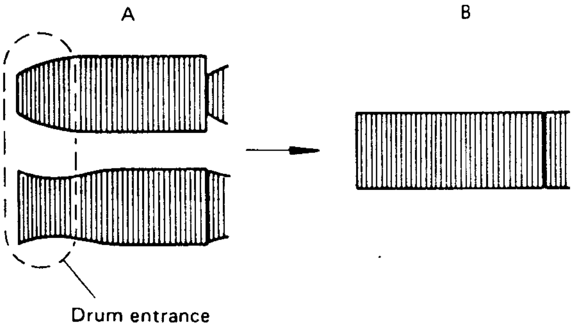


Fig. 2-4-12 Drum entrance adjustment

1) Refer to Fig. 2-4-12. Examples of incorrect waveforms are shown by A.
   Use a screwdriver to adjust the supply guide roller so that the rising portion (drum entrance) of the waveform becomes flat as shown by B.

2) In the same manner as for the drum entrance, turn the take-up guide roller to adjust the falling portion (drum exit) of the FM waveform.
Incorrect examples are shown by C in Fig. 2-4-13, while D indicates the correct adjustment.

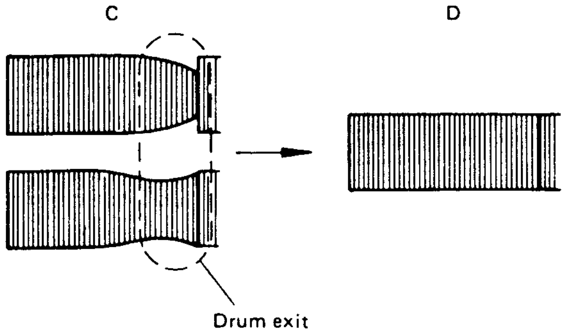


Fig. 2-4-13 Drum exit adjustment

3) In addition to observing the waveform, confirm absence of tape slippage or curling at the supply and take-up guide poles.
If the tape separates from the guide or wrinkling occurs at the supply guide pole, adjust the supply guide pole height (refer to section 2.4.5).
If at the take-up guide pole, adjust by turning the audio/control head screw (refer to section 2.4.5).

6. Observe the FM waveform and adjust the TRACKING knob for minimum FM output level.
   1) If the waveform becomes similar to A, B, C or D in Fig. 2-4-14, carefully adjust the supply and take-up guide rollers so that the waveform becomes similar to E, F or G.

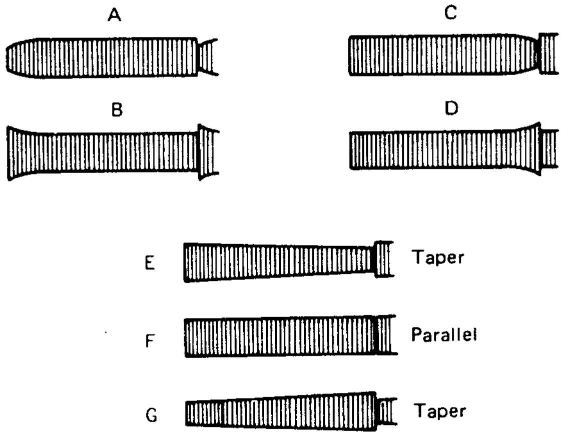


Fig. 2-4-14 Minimum FM waveform

Note: At this time, if the waveform fluctuates, adjust for minimum fluctuation.

2) Vary the FM output level and perform fine adjustment of the supply and take-up guide rollers.

- Audio/control head height and azimuth adjustments

Incorrect audio/control head height can impair audio signal-to-noise ratio when playing back a pre-recorded tape.

1. Connect an oscilloscope to the AUDIO OUT terminal of the MAIN board.
2. Play 6 kHz segment (stairstep signal) of the alignment tape MH-1.

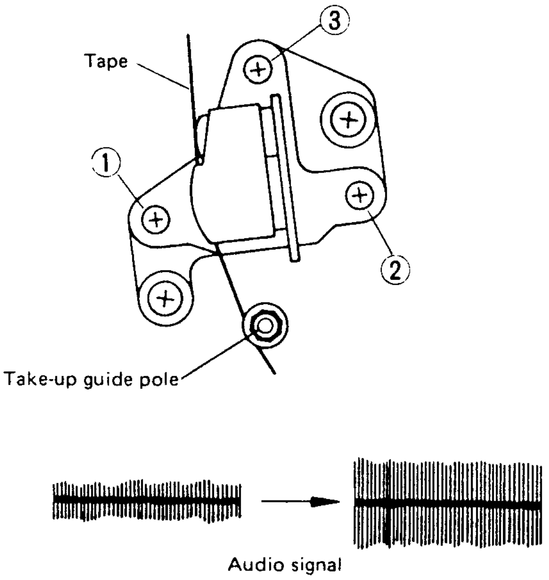


Fig. 2-4-15 Audio/Control head adjustment

1) Adjust Screw ② so that small tape wrinkles are not produced at the take-up guide pole, and azimuth with screw ③.
2) Turn screws ①, ② and ③ by small and equal increments to adjust the audio/control head height for maximum audio output.
With screw ① as reference, adjust inclination with screw ② and azimuth with screw ③.

Notes:

a) During adjustment, avoid turning reference screw ① by more than approximately 1/4 turn (this is also to avoid damaging the alignment tape).
b) After adjusting screw ②, be sure to adjust the azimuth with screw ③.

3. Repeat these adjustment steps to obtain maximum audio output with minimum level fluctuation.

- Setscrew tightening

1. After confirming absence of tape wrinkling and other transport irregularities, tighten the setscrews under the guide rollers while in the Stop mode.

   Note: Since the guide rollers are easily moved, use care when tightening.

2. Again perform the preliminary checks.

- Servo circuit adjustment

1. Perform tracking preset adjustment (refer to section 3.3.4).

- Control head phase adjustment

1. Connect an oscilloscope to TP6 (PB FM) of the MAIN board. Trigger the oscilloscope externally with the signal from TP411 (DRUM F.F.) of the MAIN board.
2. Play the alignment tape (stairstep signal) MH-2.
3. Set the trigger to ⊖ slope and observe the CH-1 FM waveform.

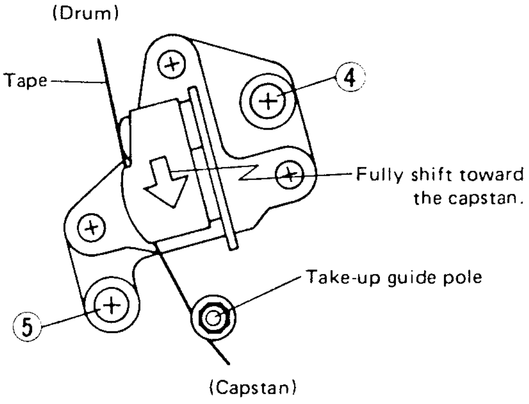


Fig. 2-4-16 Control head phase adjustment

1) Set the TRACKING knob to AUTO (center click position).
2) Loosen screws ④ and ⑤ . Shift the A/CTL head assembly fully in the direction of the capstan. See Fig. 2-4-16.
3) Cover screw ④ with the A/CTL head position tool and set the pin of the tool into the hole next to screw ④.
4) Gradually turn the tool clockwise and observe the FM waveform output. Set the A/CTL head assembly at the point of the first output peak.
5) Tighten screws ④ and ⑤ for fixing the A/CTL head assembly.

- Final checks

1. Connect an oscilloscope to TP6 (PB FM) of the MAIN board. Trigger the oscilloscope externally with the signal from TP411 (DRUM F.F.) of the MAIN board.
   1) Play the alignment tape MH-2 (stairstep signal). Confirm that the FM waveform satisfies the specifications during playback of alignment tape MH-2. Refer to Fig. 2-4-9.
   2) Supply a video signal and perform recording, then play back. Confirm that the FM waveform also satisfies the specifications during playback of MH-2.
2. Perform overall checks and adjustments of the servo circuit (refer to section 3.3) and video circuit (refer to section 3.4).
3. Perform the audio circuit adjustment (refer to section 3.5).

SECTION 3
ELECTRICAL ADJUSTMENTS

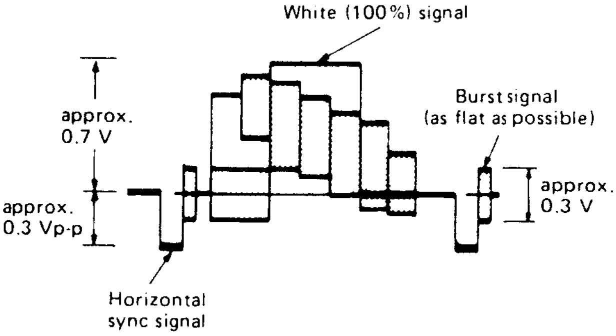
3.1 PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts.

It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

3.2 REQUIRED TEST EQUIPMENT

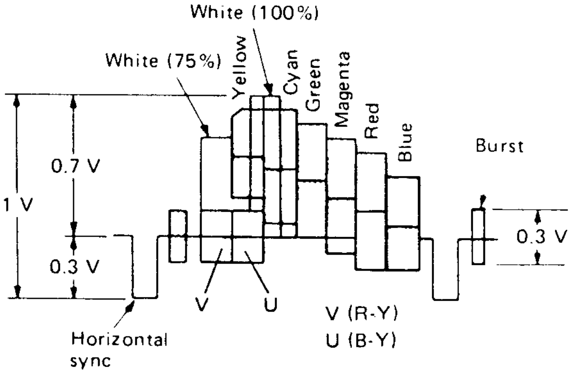
1. Colour television or monitor
2. Oscilloscope: Wide-band, dual-trace, triggered delayed sweep
3. Frequency counter
4. Audio oscillator
5. Audio voltmeter
6. Digital voltmeter
7. Signal generator: RF/IF sweep/marker
8. Signal generator : PAL colour bar, stairsteps


White (100%) signal
approx.
0.7 V
Burst signal
(as flat as possible)
approx.
0.3 V
approx.
0.3 Vp-p
Horizontal
sync signal

Colour-bar signal of pattern generator

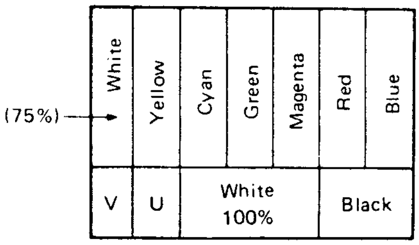
Fig. 3-2-1

9. Alignment tape : MHz
10. Recording cassette


White (100%)
White (75%)
Yellow
Cyan
Green
Magenta
Red
Blue
Burst
0.7 V
1 V
0.3 V
0.3 V
V
U
V (R-Y)
U (B-Y)
Horizontal
sync

Colour bar signal waveform

Fig. 3-2-2


(75%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
V
U
White
100%
Black

Colour bar pattern

Fig. 3-2-3

3.2.1 JVC alignment tape contents

1. MH-2 contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairsteps	6 kHz	• Interchangeability checks and adjustments • Servo circuit checks and adjustments • Audio head azimuth adjustments
2	5 minutes	(none)	3 kHz	• Tape speed checks • Wow and flutter checks
3	10 minutes	Colour bars	1 kHz (0 dB)	• Video signal playback circuit checks and adjustments • Audio signal playback circuit checks and adjustments
4	3 minutes	RF sweep	(none)	• Video head resonance adjustments • Markers: 2.0, 4.0, 5.0 MHz

Table 3-2-1

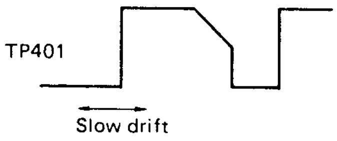
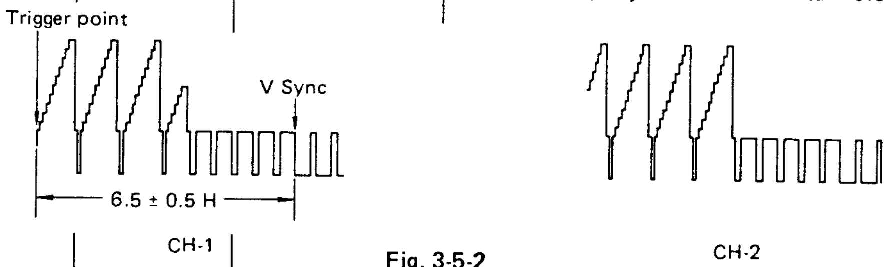
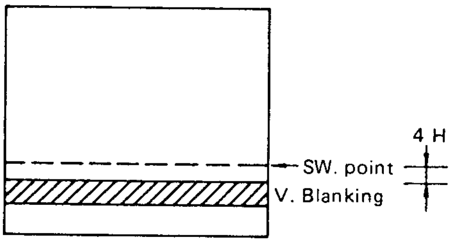
3.3 REGULATOR CIRCUIT ($\boxed{0}\boxed{1}$ Power Supply Board)

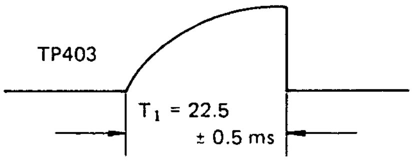
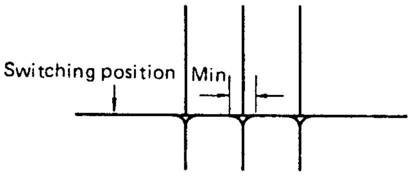
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	SWD 5 V	TP1 (SWD 5 V) TP GND	R6 (5 V ADJ)	REC	1. Connect a digital voltmeter between TP1 and TP GND. 2. Adjust R6 for 5.33 ± 0.1 V.

3.4 TIMER CONTROL CLOCK ($\boxed{3}\boxed{4}$ Timer board)

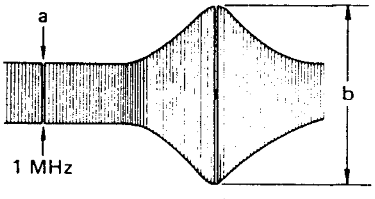
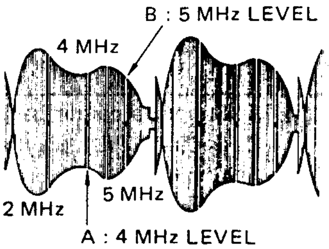
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Clock	TP404	C409	•E-E	1. Short TP401 and TP402. (The microprocessor enters the Test mode.) 2. Short both ends of C407 (0.47/50) once. This resets the microprocessor. 3. Measure the period at TP404. Adjust trimmer capacitor C409 to obtain: 1.000000 sec ± 1.2 usec **Note:** After reset in the Test mode, all indicator segments light (except illuminated mode symbols).

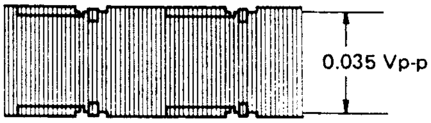
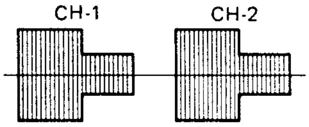
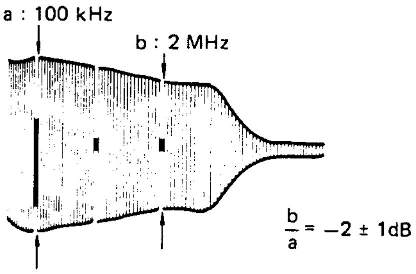
3.5 SERVO CIRCUIT (02 Main board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Drum free-run Method A	TP414 (DRUM FG)	R437 (DRUM DISCR)	•Colour bar or TV signal •REC •Short TP421 and TP Vcc	1. Connect a frequency counter to TP414. 2. Adjust R437 for 1500 Hz ± 4 Hz.
	Method B	TP401 (CTL PULSE)			1. Connect an oscilloscope to TP401. 2. Trigger the oscilloscope externally (–slope) with the signal from TP411 (Drum FF). 3. Adjust R437 to stabilize the REC CTL PULSE. (At this time, a drift at the rate of less than 40 ms in 5 seconds is acceptable).  Fig. 3-5-1
2	PB Switch point Method A	TP110 (VIDEO OUT) or VIDEO OUT	R429 (CH-1 SW PHASE) R427 (CH-2 SW PHASE)	•MH-2 Stairstep •PB	1. Connect an oscilloscope to VIDEO OUT or TP110. 2. Play the alignment tape (stairstep). 3. Trigger the oscilloscope externally (–slope) with the signal TP411. 4. Adjust R429 to position the trigger point 6.5 ± 0.5 H from V. sync. 5. Set oscilloscope sync slope to plus (+). In this condition, adjust R427 to obtain 6.5 H position.  Fig. 3-5-2
	Method B	TV screen			1. Play the alignment tape, and adjust R429 so that the switching point is 4H before vertical blanking. 2. Next adjust R427 so the switching points form a single line.  Fig. 3-5-3

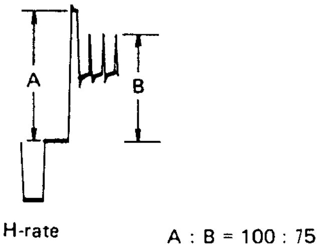
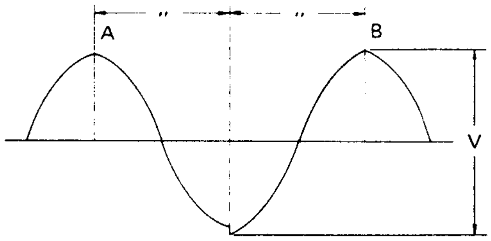
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	Tracking preset Method A	TP403 (TRACK)	R443 (PRESET)	•Colour bar or TV signal •REC → PB	1. Set the TRACKING knob (R202) to the center click position. 2. Supply a colour bar signal, record then playback. 3. Connect an oscilloscope to TP403. 4. Adjust R443 so that the TP1 becomes 22.5 ± 0.5 msec.  Fig. 3-5-4
	Method B	TV screen			1. Supply a colour bar signal, record then playback. 2. Set TRACKING knob to the center click position. 3. Observe the TV screen and adjust R443 to minimize dihedral error.  Fig. 3-5-5
	Tracking sub NOTE: This adjustment is generally unnecessary except when replacing R202 (TRACKING) or R203 (Tracking sub).				1. Set the TRACKING knob (R202) to the center click position. 2. Adjust R203 of the 33 OPE board so that the total resistance of R202 and R203 becomes 125 k ohms.
4	Control head Phase				See section 2.4.6.

3.6 VIDEO CIRCUIT (02 Main board)

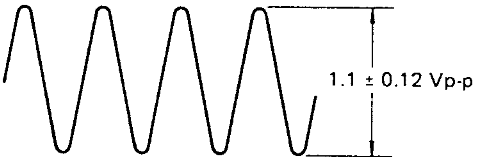
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Video Head Resonance, Q (Quality Factor) Method A	TP123 (CH-1 REC CURRENT) TP126 (PB ENV)	C101 (CH-1 fo) R116 (CH-1 Q)	•RF Sweep •PB	1. Set for the playback mode without a tape. (Refer to mechanical adjustment 2.3.1). 2. Connect the oscilloscope to TP126. 3. Apply the sweep signal from a video sweep generator to TP123. Then adjust the sweep gain so that the waveform does not distort at TP126. 4. At TP126 adjust C101 for maximum level at the 5.0 MHz marker position. 5. Adjust R116 so that the 5.0 MHz level becomes 2.5 times the 1.0 MHz.  $\frac{b}{a} = 2.3 - 2.5$ Fig. 3-6-1
		TP124 (CH-2 REC CURRENT)	C102 (CH-2 fo) R117 (CH-2 Q)		6. In the same manner, adjust C102 and R117 for CH-2.
	Method B		 B : 5 MHz LEVEL 4 MHz 2 MHz 5 MHz A : 4 MHz LEVEL $\frac{B}{A} = 1 - 1.1$ Fig. 3-6-2	•MH-2 RF Sweep •PB	1. Playback RF sweep segment of the MH-2 alignment tape. 2. Connect the oscilloscope to TP106. 3. Trigger the oscilloscope externally with the signal from TP411. 4. Use (–) trigger for CH-1 and (+) trigger for CH-2. 5. Turn R116 fully counterclockwise and R117 fully clockwise not to damp. 6. Adjust C101 to set the CH-1 resonance point to 5.0 MHz and C102 to set the CH-2 resonance point 5.0 MHz. 7. Adjust R116 so that the level of 5 MHz becomes greater than 4 MHz level by 1 dB. 8. In the same manner, adjust R117 for CH-2. 9. If the level of CH-1 and CH-2 differ, adjust the higher level channel to metch the lower by setting R116 and R117.
2	VXO	IC201-pin ⑬ (fsc 4.433 MHz)	R210 (VXO 4.433MHz)	•MH-2 Colour bar •PB or •TV signal (colour) •REC → PB	1. Connect a frequency counter to IC201-Pin ⑬ . 2. Playback the pre recorded tape or alignment tape. 3. Adjust R210 for 4.433619 MHz ± 50 Hz.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	REC FM level	TP122 (REC FM)	R175 (REC FM ADJ)	•Colour bar •REC	1. Supply a colour bar input signal. 2. Connect an oscilloscope to TP122. 3. Adjust R175 so that the pedestal level of the vertical blanking component becomes 0.035 Vp-p.  Fig. 3-6-3
4	REC colour level	TP204 (PB COL)	R217 (REC COL ADJ)	•MH-2 colour bar •PB •Colour bar •REC → PB	1. Connect an oscilloscope to TP204. 2. Trigger the oscilloscope externally (– slope) with the signal from TP411. 3. Playback the alignment tape colour bar segment, then measure the colour level (CH-1). Make a note of this as level "a". 4. Supply a colour bar signal, record, then playback. 5. During recording, adjust R217 so that the colour level of CH-1 becomes 110 ± 5% of the level "a". **Note:** Playback the alignment tape, then playback a self-recorded tape and confirm the absence of colour level reversal between channels.  Fig. 3-6-4
5	V PULSE position	TV screen	R432 (V. LOCK)	•Colour bar •REC → PB → STILL	1. Supply a colour bar signal, record then playback. 2. Set for STILL playback mode. 3. Observe the picture display and adjust R432 for minimum vertical jitter.
6	P.B. Frequency response Method A	TP110 (VIDEO OUT)	R188 (RF EQ)	•Colour bar •REC → PB	1. Connect an oscilloscope to TP110. 2. Set the sharpness control to center click position. 3. Record and playback a video sweep (with sync) signal. 4. Adjust R188 so that the 2 MHz level become –2 ± 1 dB with reference to 100 kHz.  Fig. 3-6-5

–VIDEO –

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
	Method B			•PHILIPS pattern signal •REC → PB	1. Connect an oscilloscope to 35 pin of IC102. 2. Record and playback the Philips pattern signal. 3. Adjust R127 so that the crosshatch signal level at 35 pin becomes 75% as shown Fig. 3-6-6. 4. Confirm absence of flicker, black-white reversal in the playback picture. If necessary, readjust R116, R117 and R127 carefully.  Fig. 3-6-6
7	SECAM DET	TP210 (S DET ADJ)	L308 (1/2 fH TUNING) R337 (S DET ADJ)	•SECAM colour bar •E-E	1. Connect an oscilloscope to TP210. 2. Adjust R228 so that transition step becomes centered between "A" and "B" as shown in Fig. 3.6.7.  Set this point to center position between points "A" and "B". V = more than 6.0 Vp-p in REC V = 5 ± 0.5 Vp-p in PB Fig. 3-6-7
				•REC → PB	3. Record then playback. 4. Adjust R228 for 6.0 ± 0.5 Vp-p.

3.7 AUDIO CIRCUIT (02 Main board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Audio Bias level	TP31 (BIAS LEVEL) TP32 (GND)	R21 (BIAS LEVEL)	•REC	1. Connect a digital voltmeter between TP31 and TP32 (GND). 2. Set for the REC mode without signal. 3. Adjust R21 for 2.4 ± 0.2 mV.
2	Audio PB level	AUDIO OUT	R5 (PB LEVEL)	•Colour bar signal •Audio signal −20 dBs/1 kHz •REC → PB	1. Connect an oscilloscope to AUDIO OUT. 2. Record and playback a video signal and an audio signal. 3. Adjust R5 for −6 dBs ± 1 dBs (1.1 ± 0.12 Vp-p) at AUDIO OUT.  Fig. 3-7-1

3.8 TUNER/IF CIRCUIT ($\boxed{0}\boxed{4}$ TU/IF board)

Unless otherwise indicated, all test points and adjustments are located on the TUNER/IF board.

Equipment required

1. Oscilloscope
2. IF sweep signal generator with suitable markers (PIF, SIF, etc.)
3. DC power supplies – For power bias (12.0 V)
   – For IF AGC bias (approx. 5 V variable)
4. Sweeper probe (sweep signal supply cable) as shown below.

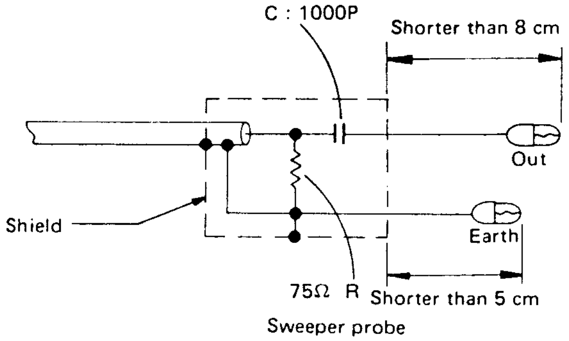
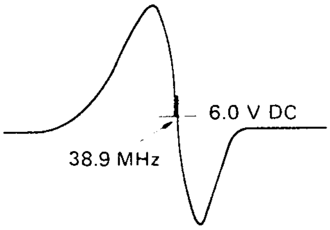
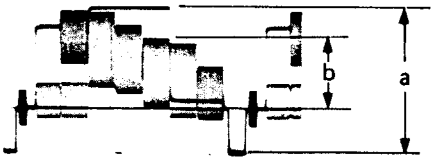


Fig. 3-8-1

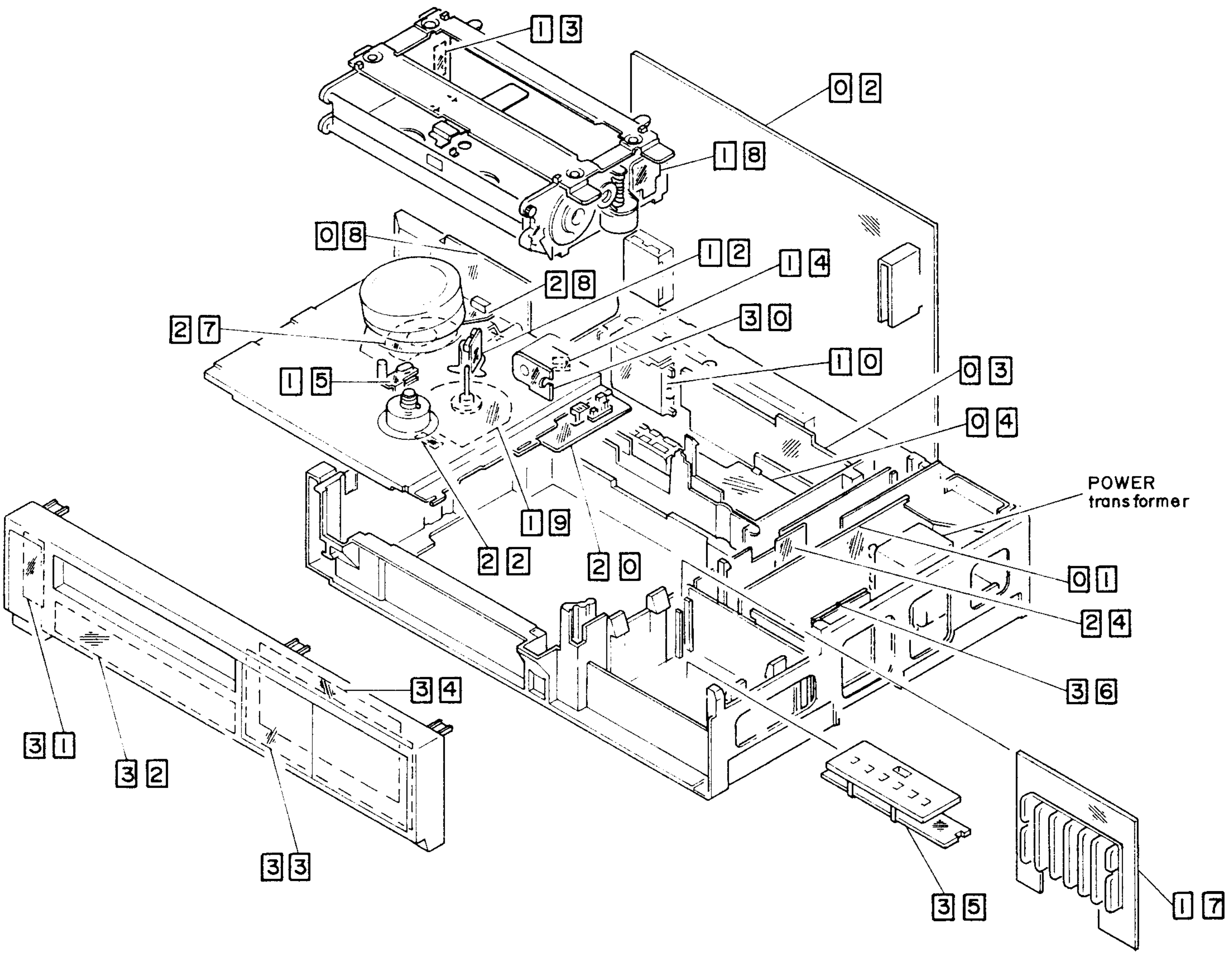
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	LLD Coil	TP12 (V. DET. OUT)	T3 (LLD)	Sweep generator (38.9 MHz) EG/E (39.5 MHz) EK	1. Connect the sweep generator out probe to pin 9 of IC1 (M51316BP). 2. Adjust the sweep gain so that the waveform does not distort as observed with the oscilloscope. (approx 25 mVrms) Connect a DC power supply to TP14 (AGC) Adjust AGC bias for 1 Vp-p TP12 (V. DET OUT). 3. Adjust T3 (LLD coil) so that video IF carrier 38.9 MHz marker becomes maximum level.
2	S. TRAP Coil	TP12 (V. DET OUT)	T1 (S. TRAP)	Sweep generator (33.4 MHz) EG/E (33.5 MHz) EK	1. In the same manner as above item 1, connect the sweep generator and power supplies. 2. Adjust T1 (S. trap coil) so that sound IF carrier 33.4 MHz marker becomes minimize level.
3	IF Coil	TP12 (V. DET. OUT)	IF Coil (Inside the tuner unit.)	Sweep generator (38.15 MHz) EG/E (39.5 MHz)	1. Connect the sweep generator out probe to test point inside the tuner unit. 2. Sweep level and power supplies are the same manner as item 1. 3. Adjust IF coil (inside the tuner unit) so that 38.15 MHz marker becomes maximum level.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
4	AFC Coil	Pin 24 of IC1 (M51316BP)	T2 (AFC COIL)	Sweep generator (38.9 MHz) EG/E (39.5 MHz) EK	1. Set AFC SW to ON and sweep generator to 8.5 mVrms. 2. Connect the oscilloscope to pin 24 of IC1. 3. Connect a DC power supply to pin 3 of IC3 and adjust the DC power supply to obtain 2.2 V DC at pin 3. 4. Adjust the sweep gain so that the "S" curve appears as observed with the oscilloscope. Adjust AGC bias so that the "S" curve does not distort. 5. Adjust T2 (AFC) so that video IF carrier (38.9 MHz) becomes 6.0 V DC as shown in figure.  Fig. 3-8-2
5	Adjacent Trap (EG/E only)	TP12 (V DET OUT)	T5 (ADJACENT TRAP)	IF sweep	1. Connect an IF sweep generator to the test point in the front end. 2. 32.4 MHz signal that is modulated at 400 Hz is supplied to test point in the front end. 3. Adjust T5 so that the waveform level at TP12 becomes minimum.
6	AGC	IF end (at the tuner unit)	R10 (AGC)	Colour bar TV channel signal generator	1. Receive a signal. Adjust R10 for maximum level at tuner if terminal. Then readjust R10 to rednce this level by 10 dB.
7	Color Level	TP13 (VIDEO OUT)	R32 (COLOR LEVEL)	Colour bar TV channel signal generator	1. Receive a color signal. Adjust R32 so that the magenta level is 44% of the Y signal (including sync) at TP12.  b : magenta a : b = 1 : 0.44 Fig. 3-8-3
8	AUDIO Level	TP21 (AUDIO OUT)	R40 (AUDIO LEVEL)	Colour bar TV channel signal generator	1. Receive a signal that includes 1 kHz ± 50 kHz DEV audio modulation. Adjust R40 for −14 dBs audio output level at TP21 (Audio out). However, with 1 kHz ± 30 kHz DEV audio modulation, adjust for −18 dBs.

SECTION 4
CHARTS AND DIAGRAMS

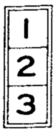
4.1 CIRCUIT BOARD LOCATIONS

No.	NAMES	No.	NAMES	No.	NAMES
01	POWER SUPPLY	17	HEAT-SINK	32	DISPLAY
02	MAIN	18	CASSETTE HOUSING	33	OPERATION
03	TERMINAL –	19	CAPSTAN MOTOR	34	TIMER
04	TUNER/IF	20	DECK TERMINAL	35	PRESETTER
05	–	21	–	36	POWER TRANS
06	–	22	TAKE UP SENSOR		
07	–	23	–		
08	HEAD/DRUM MDA	24	POWER TRANSISTOR		
09	–	25	–		
10	RF CONV/MIX BOOSTOR	26	–		
11	–	27	DRUM FG		
12	A/CTL HEAD	28	DRUM MOTOR		
13	END SENSOR	29	–		
14	LOADING SENSOR	30	LOADING MOTOR		
15	CASSETTE LAMP	31	POWER SW		
16	–	40	REMOCON		

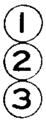


13
02
18
08
12
14
28
27
30
10
03
15
04
POWER
transformer
19
22
20
01
24
36
34
31
32
33
35
17

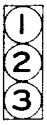
1. Connections



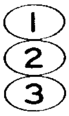
: Connector



: Board



: Board in connector

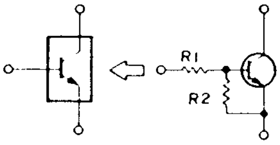


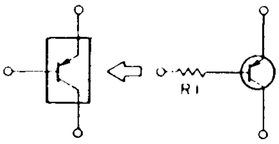
: Connected pattern in the board.

2. Indications

COUNT UP : Active only at high.
$\overline{\text{COUNT DOWN}}$: Active only at low.

3. Digital transistor





DTA114T T mark only

Note:
The digital transistor includes built in resistors.
It features small size and high rellability.
Both PNP and NPN types are available.

Uses:
Inverter, Interface, driver circuits.

4. Signal flow in the schematic

➡ Recording signal path
⇨ Playback signal path
→ REC/PB signal path

5. Schematic diagram values

Unless otherwise specified,

1. All resistance values are in ohms (1/6 W, 1/8 W).
2. All capacitance values are in μF.
3. All inductance values are in μH.
4. All diodes are 1SS133 or MA165.
5. Voltages are DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltages differ between recording and playback, the voltage during playback is shown in parentheses.
6. Waveforms (VIDEO System) are measured with a color bar during recording and playback with alignment tape.
7. Waveforms (AUDIO System) are measured with 1 kHz (−8 dBs) during recording and playback with alignment tape (1 kHz).
8. Shaded (▨) parts are critical for safety.
   Replace only with specified parts numbers.

4.2 KEY TO ABBREVIATIONS

A	AC	: Alternating Current
	ACC	: Automatic Color Control
	A/CTL	: Audio/Control
	ADC	: Analog to Digital Converter
	ADD	: Adder
	ADJ	: Adjustment
	A DUB	: Audio Dubbing
	AE	: Audio Erase
	AEF	: Automatic Editing Function
	AFC	: Automatic Frequency Control
	AFT	: Automatic Fine Tuning
	AGC	: Automatic Gain Control
	AH	: Audio Head
	AHD	: Audio High Density Disk
	AL	: After Loading
	ALC	: Automatic Ligh Compensation Automatic Level Control
	ALM	: Alarm
	ALU	: Arithmetic Logic Unit
	AM	: Amplitude Modulation
	AMP	: Amplifier
	ANT	: Antenna
	APC	: Automatic Pedestal Control Automatic Phase Control
	APL	: Average Picture Level
	A/S/M	: Audio/Servo/Mechacon
	ASS'Y	: Assembly
	ATT	: Attenuator
	AUD	: Audio
	AUTO	: Automatic
	AUX	: Auxiliary

B	B	: Base
	BAL	: Balance
	BATT	: Battery
	BBD	: Bucket Brigade Device
	BCD	: Binary Coded Decimal
	BEG	: Beginning
	BFP	: Burst Flag Pulse
	BIT	: Binary Digit
	BLK	: Black, Blanking
	BLU	: Blue
	BNC	: Bayonet Connector
	BOT	: Beginning of Tape
	BPF	: Bandpass Filter
	BRK	: Brake
	BRN	: Brown
	BRT	: Brightness
	BT	: Band Tuning
	BUFF	: Buffer
	BW or B/W	: Black and White

C	C	: Capacitance, Collector, Color
	CAL	: Calibration
	CAP	: Capstan, Capacitor
	CAR	: Carrier
	CARR	: Carrier
	CASS	: Cassette
	CCD	: Charge, Coupled Device
	CCT	: Circuit
	CdS	: Cadmium Sulphide
	CD	: Count Down
	CF	: Ceramic Filter, Color Frame
	CE	: Chip Enable
	CH	: Channel
	CHG	: Charge
	CHROMA	: Chrominance
	CLK	: Clock
	CLR	: Clear
	CMOS	: Complementary Metal Oxide Semiconductor
	CMD	: Command
	CNT	: Count, Counter
	CONV	: Converter
	COL	: Color
	COM	: Common
	COMB	: Combination Comb Filter
	COMP	: Comparator Composite Compensation
	CONN	: Connector
	CTC	: Crosstalk Cancel
	CP	: Circuit Protector Clamp Pulse
	CPC	: Capstan Phase Control
	CPU	: Central Processing Unit
	CTC	: Crosstalk Cancel
	CTL	: Control

D	D	: Drum, Digital, Diode, Drain
	DAC	: Digital to Analog Converter
	dB	: Decibel
	DC	: Direct Current
	DD	: Direct Drive
	DEC	: Decoder
	DEMOD	: Demodulator
	DEMUX	: Demultiplexer
	DET	: Detector
	DEV	: Deviation
	DFRS	: Drum Free RUN STOP
	DG	: Differential Gain
	DIF	: Differential
	DISCR	: Discriminator
	DL	: Delay Line
	DOC	: Dropout Compensator
	DOD	: Drop Out Detector
	DP	: Differential Phase
	DPC	: Drum Phase Control
	DYAC	: Dynamic Aperture Control

E	E	: Edit, Emitter
	EDP	: Electronic Data Processing
	E-E	: Electric to Electric
	EF	: Emitter-Follower
	EMP	: Emphasis
	ENC	: Encoder
	EN	: Enable
	ENV	: Envelope
	EOT	: End of Tape
	EP	: Extended Play
	EQ	: Equalizer
	ES	: Electronic Switch
	ESNS	: End Sensor
	EXP	: Expander
	EXT	: External

F	F	: Farad, Fuse
	F ADV	: Frame Advance
	FDP	: Fluorescent Display Panel
	FE	: Full Erase
	FET	: Field Effect Transistor
	FF	: Fast Forward Flipflop
	FG	: Frequency Generator
	FM	: Frequency Modulation
	FMA	: FM Audio
	FR	: Full Recording, Frame, Fusible Resistor
	F REQ	: Frequency
	F-V CONV	: Frequency to Voltage Converter
	FWD	: Forward
	FWDS	: Forward Search

G	G	: Green, Gate, Grid
	GEN	: Generator
	GND	: Ground
	GRN	: Green
	GRY	: Gray

H	H	: High, Henry, Hour
	HBF	: Horizontal Burst Flag
	HD	: Horizontal Drive
	HG	: Hall Generator
	HPF	: Highpass Filter
	Hz	: Herz

I	IC	: Integrated Circuit
	ID	: Identification (Pulse)
	IF	: Intermediate Frequency
	IFR	: Infrared
	IFT	: Intermediate Frequency Transformer

IND : Indicator
INH : Inhibit
INS : Insert
INT : Internal, Interrupt
INV : Inverter
I/O : Input/Output
IR : Infrared

L L : Low, Left
LCD : Liguid Crystal Display
LED : Light Emitting Diode
LIN : Linearity
LIM : Limiter
LOAD : Loading (Cassette)
LP : Long Play
LPF : Lowpass Filter
LSB : Lower Side band

M M : Motor, Mega
MAX : Maximum
MDA : Motor Drive Amplifier
MECHACON : Mechanism Control
MIC : Microphone
MIN : Minimum
MIX : Mixer, Mixing
MMV : Monostable Multivibrator
MNOS : Metal Nitride Oxide semiconductor
MOD : Modulation, Modulator
MODEM : Modulator-Demodulator
MON : Monitor
MOS : Metal Oxide Semiconductor
MPX : Multiplexer, Multiplex
MS : Mode Select
MUT : Muting

N NAND : Not-And
NC : Not Connected, Normally Closed
NFB : Negative Feedback
NLN : Non-Linear
NO : Normally Open
NOR : Normal, Not-Or
NR : Noise Reduction

O OPAMP : Operational Amplifier
OP : Operation
ORN : Orange
OSC : Oscillator

P PB : Playback
PC : Photocoupler, Pulse Counter
PCM : Pulse Code Modulation
PGM : Program
PG : Pulse Generator
PI : Photo Interrupter
PIF : Picture Intermediate Frequency
PLA : Programmable Logic Array
PLL : Phase Locked Loop
p-p : Peak-to-Peak
POS : Position
PR : Pinch Roller
PREAMP : Preamplifier
PRL : Preroll
P/S : Pause/Still
PSC : Pulse Swallowing Control
PU : Pickup
PUT : Programmable Unijunction Transistor
PWB : Printed Wiring Board
PWM : Pulse Width Modulation
PWR : Power

Q Q : Quality Factor

R R : Red, Right
RA : Resistor Array
RAM : Random Access Memory
REC : Recording
REG : Regulated, Regulator
REF : Reference
REM : Remote
REMOCON : Remote Control (Unit)
REV : Reverse
REVS : Reverse Search
REW : Rewind
RF : Radio Frequency
ROM : Read Only Memory
RS FF : RS Flipflop
RST : Reset
R/P : Record/Playback
RPT : Repeat
RT : Rotary Transformer
RUN : Running
RY : Relay

S SC : Subcarrier, Simulcast
SAW : Sawtooth, Surface Acoustic Wave
SCH : Search
SEL : Select, Selector
SENS : Sensor
SEP : Separator
SF : Source Follower
SFF : Short Fast Forward
SFWD : Search Forward
SIF : Sound Intermediate Frequency
SN : Signal to Noise Ratio
SOL : Solenoid
SOS : Sound on Sound
SP : Standard Play
SR : Supply Reel
SREV : Search Reverse
SREW : Short Rewind
S/S : Slow/Still
SSG : Sync Signal Generator
SSNS : Start Sensor
STD : Strobe Data, Standard
SUP : Supply
SW : Switch
SWD : Switched
SYNC : Synchronization
SYSCON : System Control

T TBC : Time Base Corrector
TP : Test Point
TPZD : Trapezoid
TR : Transistor, Trimmer
Trans : Transformer
TU : Take-UUp
TC : Tension Control, Time code
TAL : Tally
TEN : Tension
TF : Thermal Fuse
TK : Tracking
TNR : Tuner
TIM : Timing
T/T : Tuner/Timer

U UL : Unloading
UNREG : Unregulated
UNSW : Unswitched

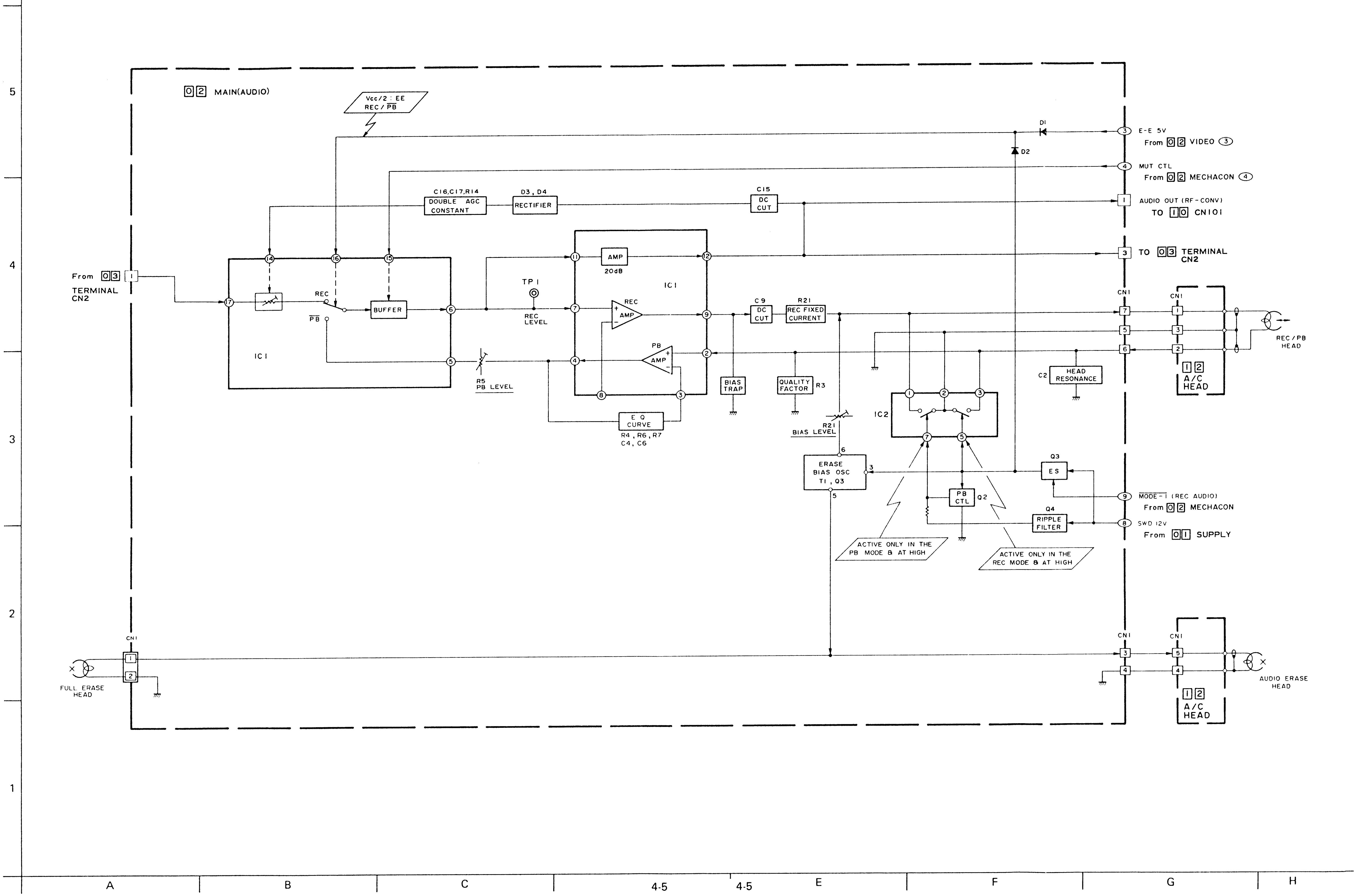
V V : Volt, Vertical
VACT : Video Action
VCO : Voltage Controlled Oscillator
VD : Vertical Drive
VIF : Video Intermediate Frequency
VR : Variable Resistor
VS : Video and Sync
VXO : Variable Crystal Oxsillator
VLT : Violet
V/T : Video/Television
V/U : VHF/UHF
VSCH : Variable Search

W W : Watt
WHT : White
WV : Working Voltage
W & D : White and Dark
WARN : Warning

X XTAL : Crystal

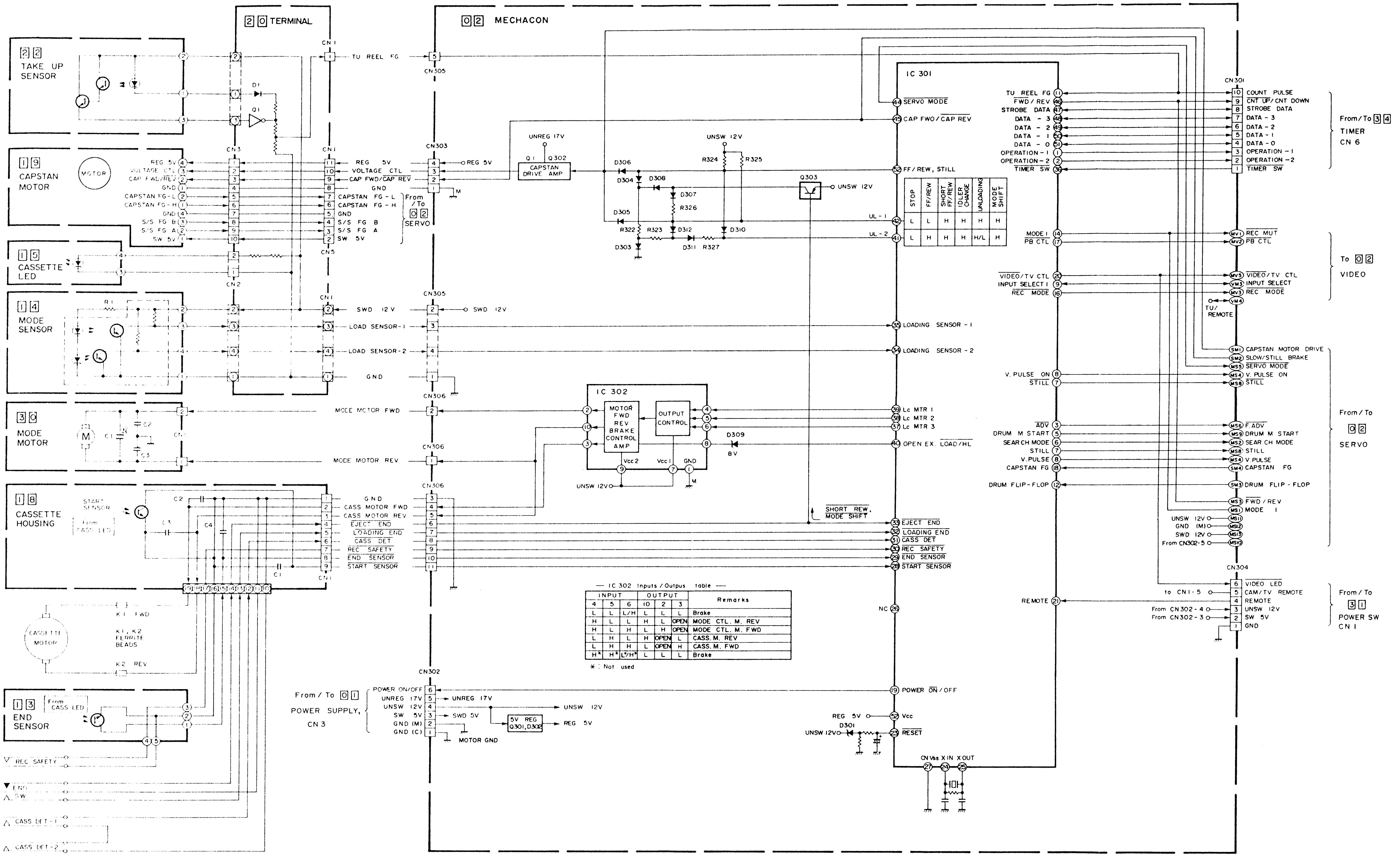
Y Y : Luminance
YEL : Yellow

4.3 AUDIO BLOCK DIAGRAM



6
5
4
3
2
1
A
B
C
E
F
G
H
02 MAIN(AUDIO)
Vcc/2 : EE
REC / PB
From 03 1
TERMINAL CN2
IC1
REC
PB
BUFFER
C16,C17,R14
DOUBLE AGC CONSTANT
D3, D4
RECTIFIER
C15
DC CUT
TP1
REC LEVEL
R5
PB LEVEL
AMP
20dB
IC1
REC AMP
PB AMP
E Q CURVE
R4, R6, R7
C4, C6
C9
DC CUT
R21
REC FIXED CURRENT
BIAS TRAP
QUALITY FACTOR R3
R21
BIAS LEVEL
ERASE BIAS OSC
T1, Q3
IC2
PB CTL Q2
Q3
ES
Q4
RIPPLE FILTER
C2
HEAD RESONANCE
D1
D2
ACTIVE ONLY IN THE PB MODE & AT HIGH
ACTIVE ONLY IN THE REC MODE & AT HIGH
E-E 5V
From 02 VIDEO ③
MUT CTL
From 02 MECHACON ④
AUDIO OUT (RF-CONV)
TO 10 CN101
TO 03 TERMINAL CN2
CN1
CN1
REC / PB HEAD
12
A/C HEAD
MODE-1 (REC AUDIO)
From 02 MECHACON
SWD 12V
From 01 SUPPLY
CN1
FULL ERASE HEAD
CN1
CN1
AUDIO ERASE HEAD
12
A/C HEAD

4.4 MECHANISM CONTROL BLOCK DIAGRAM



22 TAKE UP SENSOR
20 TERMINAL
02 MECHACON
19 CAPSTAN MOTOR
MOTOR
REG 5V
VOLTAGE CTL
CAP FWD/REV
GND
CAPSTAN FG-L
CAPSTAN FG-H
S/S FG B
S/S FG A
SW 5V
15 CASSETTE LED
14 MODE SENSOR
30 MODE MOTOR
18 CASSETTE HOUSING
START SENSOR
From CASS LED
CASSETTE MOTOR
K1 FWD
K1, K2 FERRITE BEADS
K2 REV
13 END SENSOR
REC SAFETY
END
SW
CASS DET-1
CASS DET-2
CN1
CN2
CN3
CN5
D1
Q1
R1
C1
C2
C3
C4
CN305
CN303
CN306
CN302
TU REEL FG
CAP FWD/CAP REV
CAPSTAN FG-L
CAPSTAN FG-H
From/To 02 SERVO
SWD 12V
LOAD SENSOR-1
LOAD SENSOR-2
MODE MOTOR FWD
MODE MOTOR REV
CASS MOTOR FWD
CASS MOTOR REV
EJECT END
LOADING END
CASS DET
REC SAFETY
END SENSOR
START SENSOR
UNREG 17V
Q1 Q302
CAPSTAN DRIVE AMP
UNSW 12V
D306
D304
D308
D307
R326
D305
R322
R323
D312
D310
D303
D311
R327
R324
R325
Q303
IC 301
SERVO MODE
CAP FWO/CAP REV
FF/REW, STILL
UL-1
UL-2
IC 302
MOTOR FWD REV BRAKE CONTROL AMP
OUTPUT CONTROL
Vcc2
Vcc1
GND
D309
8V
Lc MTR 1
Lc MTR 2
Lc MTR 3
OPEN EX. LOAD/HL
LOADING SENSOR-1
LOADING SENSOR-2
SHORT REW, MODE SHIFT
NC
From/To 01 POWER SUPPLY, CN 3
POWER ON/OFF
UNREG 17V
UNSW 12V
SW 5V
GND (M)
GND (C)
5V REG Q301, D302
MOTOR GND
POWER ON/OFF
REG 5V
D301
Vcc
RESET
CNVss XIN XOUT
TU REEL FG
FWD/REV
STROBE DATA
DATA-3
DATA-2
DATA-1
DATA-0
OPERATION-1
OPERATION-2
TIMER SW
CN301
COUNT PULSE
CNT UP/CNT DOWN
STROBE DATA
TIMER SW
From/To 34 TIMER CN 6
MODE 1
PB CTL
REC MUT
To 02 VIDEO
VIDEO/TV CTL
INPUT SELECT 1
REC MODE
INPUT SELECT
TU/REMOTE
CAPSTAN MOTOR DRIVE
SLOW/STILL BRAKE
SERVO MODE
V. PULSE ON
STILL
ADV
DRUM M START
SEARCH MODE
V.PULSE
CAPSTAN FG
DRUM FLIP-FLOP
FWD/REV
MODE 1
UNSW 12V
GND (M)
SWD 12V
From CN302-5
From/To 02 SERVO
CN304
VIDEO LED
CAM/TV REMOTE
REMOTE
UNSW 12V
SW 5V
GND
to CN1-5
From CN302-4
From CN302-3
From/To 31 POWER SW CN 1

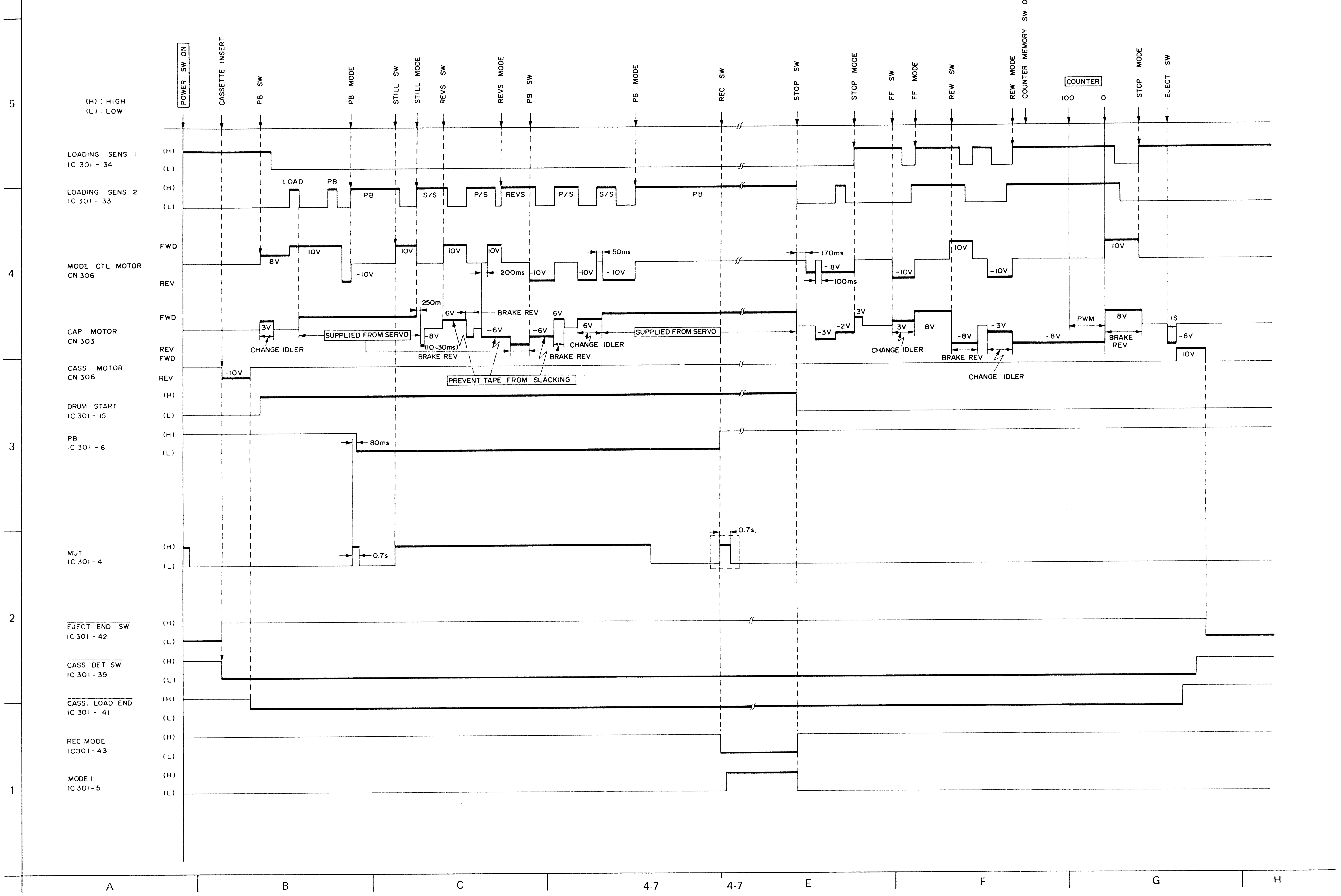
	STOP	FF/REW	SHORT FF/REW	IDLER CHANGE	UNLOADING	MODE SHIFT
UL-1 (42)	L	L	H	H	H	H
UL-2 (41)	L	H	H	H	H/L	H

— IC 302 Inputs / Outpus table —

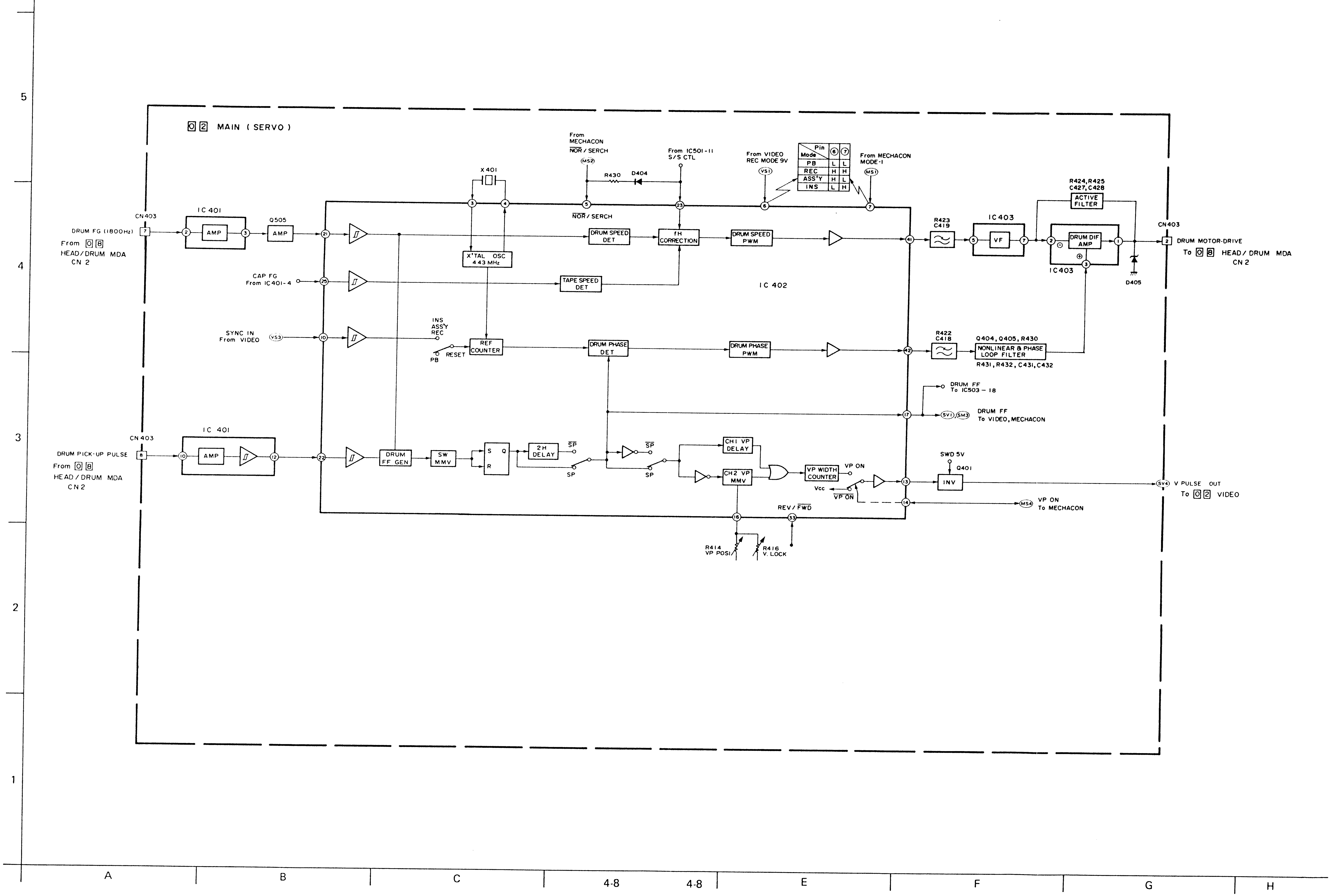
INPUT			OUTPUT			Remarks
4	5	6	10	2	3	
L	L	L/H	L	L	L	Brake
H	L	L	H	L	OPEN	MODE CTL. M. REV
H	L	H	L	H	OPEN	MODE CTL. M. FWD
L	H	L	H	OPEN	L	CASS. M. REV
L	H	H	L	OPEN	H	CASS. M. FWD
H*	H*	L*/H*	L	L	L	Brake

*: Not used

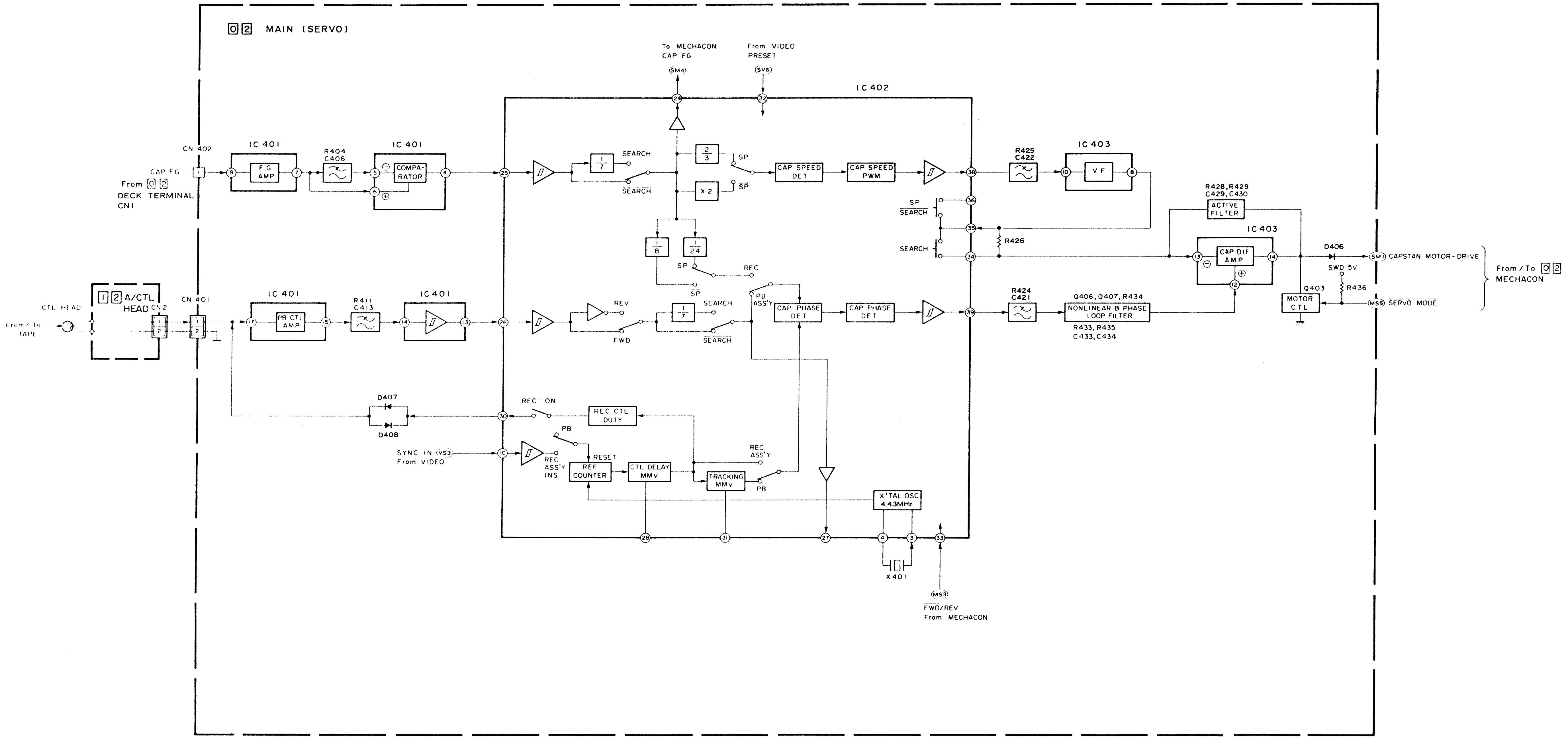
4.5 MECHANISM CONTROL TIMING CHARTS


(H) : HIGH
(L) : LOW
POWER SW ON
CASSETTE INSERT
PB SW
PB MODE
STILL SW
STILL MODE
REVS SW
REVS MODE
PB SW
PB MODE
REC SW
STOP SW
STOP MODE
FF SW
FF MODE
REW SW
REW MODE
COUNTER MEMORY SW ON
COUNTER
100
0
STOP MODE
EJECT SW
LOADING SENS 1
IC 301 - 34
LOADING SENS 2
IC 301 - 33
LOAD
PB
PB
S/S
P/S
REVS
P/S
S/S
PB
MODE CTL MOTOR
CN 306
FWD
REV
8V
10V
-10V
10V
10V
10V
200ms
-10V
-10V
50ms
- 10V
170ms
- 8V
100ms
-10V
10V
-10V
10V
CAP MOTOR
CN 303
250m
3V
CHANGE IDLER
SUPPLIED FROM SERVO
-8V
(10-30ms)
BRAKE REV
6V
BRAKE REV
-6V
-6V
6V
6V
CHANGE IDLER
BRAKE REV
SUPPLIED FROM SERVO
PREVENT TAPE FROM SLACKING
-3V
-2V
3V
3V
8V
CHANGE IDLER
-8V
BRAKE REV
-3V
CHANGE IDLER
-8V
PWM
8V
BRAKE REV
1S
-6V
10V
CASS MOTOR
CN 306
-10V
DRUM START
IC 301 - 15
PB
IC 301 - 6
80ms
MUT
IC 301 - 4
0.7s
0.7s
EJECT END SW
IC 301 - 42
CASS. DET SW
IC 301 - 39
CASS. LOAD END
IC 301 - 41
REC MODE
IC301 - 43
MODE 1
IC 301 - 5
(H)
(L)
6
5
4
3
2
1
A
B
C
4-7
4-7
E
F
G
H

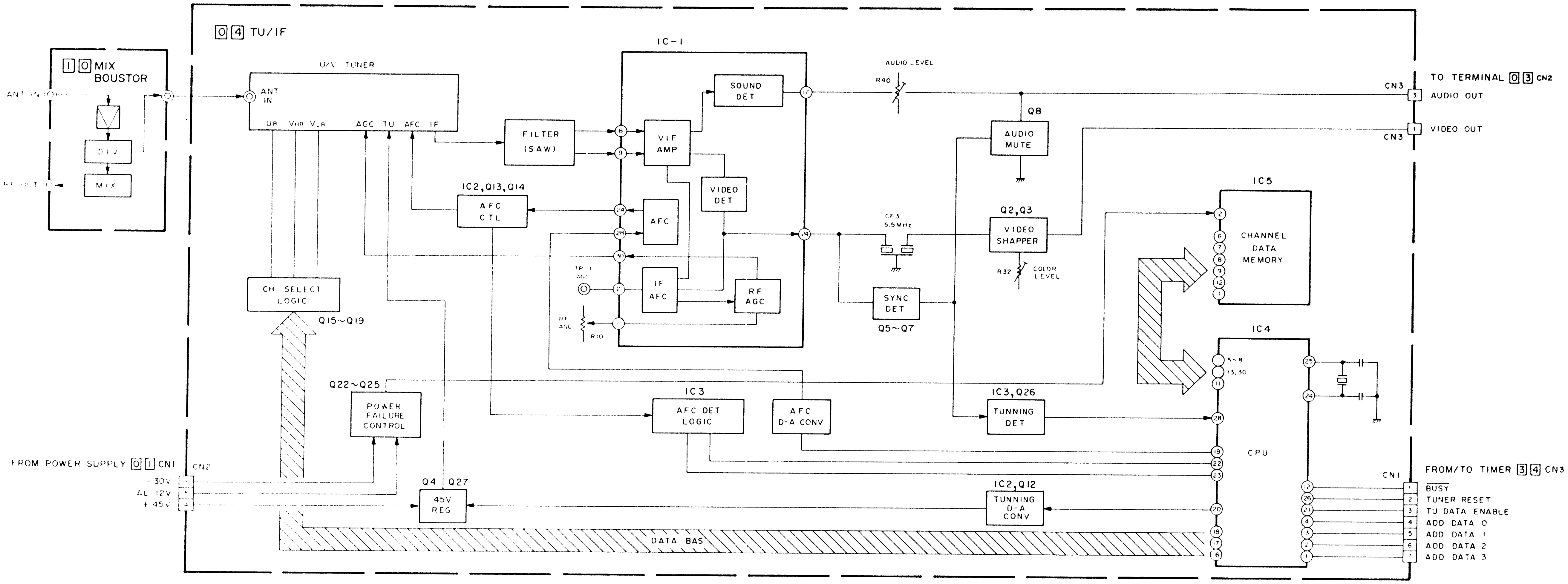
4.6 DRUM SERVO BLOCK DIAGRAM


02 MAIN (SERVO)
CN403
DRUM FG (1800Hz)
From 08
HEAD/DRUM MDA
CN 2
IC 401
AMP
Q505
AMP
CAP FG
From IC401-4
SYNC IN
From VIDEO
VS3
X401
X'TAL OSC
4.43 MHz
INS
ASS'Y
REC
PB
RESET
REF
COUNTER
From
MECHACON
NOR / SERCH
MS2
R430
D404
From IC501-11
S/S CTL
NOR / SERCH
DRUM SPEED
DET
fH
CORRECTION
DRUM SPEED
PWM
TAPE SPEED
DET
IC 402
From VIDEO
REC MODE 9V
VS1
Pin / Mode | 6 | 7
PB | L | L
REC | H | H
ASS'Y | H | L
INS | L | H
From MECHACON
MODE-1
MS1
R423
C419
IC403
VF
R424, R425
C427, C428
ACTIVE
FILTER
DRUM DIF
AMP
IC403
D405
CN403
DRUM MOTOR-DRIVE
To 08 HEAD/DRUM MDA
CN 2
DRUM PHASE
DET
DRUM PHASE
PWM
R422
C418
Q404, Q405, R430
NONLINEAR & PHASE
LOOP FILTER
R431, R432, C431, C432
DRUM FF
To IC503 − 18
SV1, SM3
DRUM FF
To VIDEO, MECHACON
CN403
DRUM PICK-UP PULSE
From 08
HEAD/DRUM MDA
CN2
IC 401
AMP
DRUM
FF GEN
SW
MMV
S
Q
R
2H
DELAY
$\overline{SP}$
SP
$\overline{SP}$
SP
CH1 VP
DELAY
CH2 VP
MMV
VP WIDTH
COUNTER
VP ON
Vcc
$\overline{VP ON}$
SWD 5V
Q401
INV
SV4
V PULSE OUT
To 02 VIDEO
MS4
VP ON
To MECHACON
REV/$\overline{FWD}$
R414
VP POSI
R416
V. LOCK
6
5
4
3
2
1
A
B
C
D
E
F
G
H

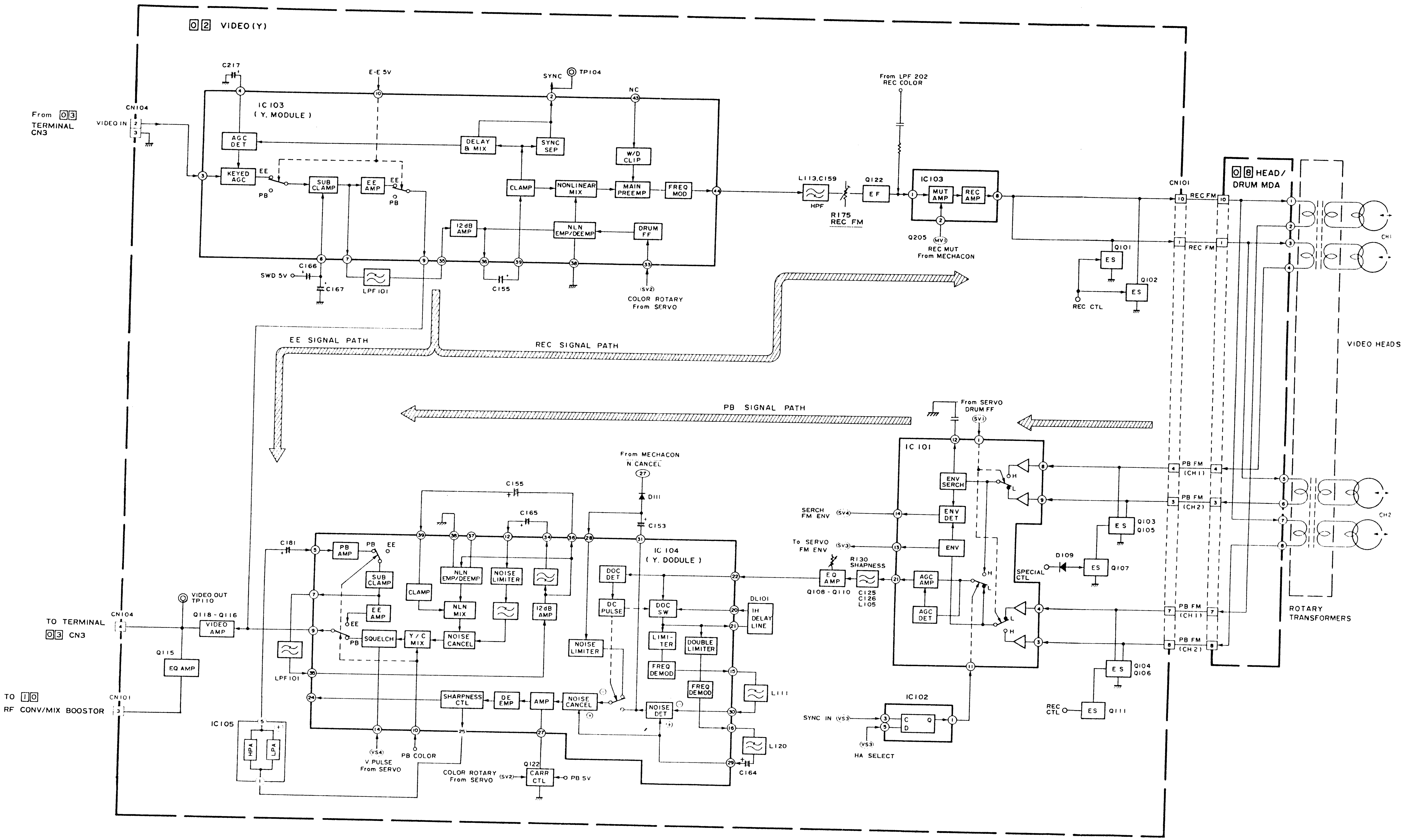
4.7 CAPSTAN SERVO BLOCK DIAGRAM


0 2 MAIN (SERVO)
To MECHACON CAP FG
SM4
From VIDEO PRESET
SV6
IC 402
CN 402
CAP FG
From 0 2 DECK TERMINAL CN1
IC 401
F G AMP
R404 C406
IC 401
COMPA-RATOR
1/7
SEARCH
$\overline{\text{SEARCH}}$
2/3
SP
X 2
$\overline{\text{SP}}$
CAP SPEED DET
CAP SPEED PWM
R425 C422
IC 403
V F
R428, R429 C429, C430
ACTIVE FILTER
IC 403
SP $\overline{\text{SEARCH}}$
SEARCH
R426
1/8
1/24
SP
REC
$\overline{\text{SP}}$
CAP DIF AMP
D406
SM1 CAPSTAN MOTOR-DRIVE
SWD 5V
R436
Q403
MOTOR CTL
MS5 $\overline{\text{SERVO MODE}}$
From / To 0 2 MECHACON
1 2 A/CTL HEAD
CTL HEAD
From / To TAPE
CN 2
CN 401
IC 401
PB CTL AMP
R411 C413
IC 401
REV
FWD
1/7
SEARCH
$\overline{\text{SEARCH}}$
PB ASS'Y
CAP PHASE DET
CAP PHASE DET
R424 C421
Q406, Q407, R434
NONLINEAR & PHASE LOOP FILTER
R433, R435 C433, C434
D407
D408
REC : ON
REC CTL DUTY
PB
SYNC IN (VS3) From VIDEO
REC ASS'Y INS
RESET
REF COUNTER
CTL DELAY MMV
REC ASS'Y
TRACKING MMV
PB
X'TAL OSC 4.43MHz
X401
MS3
$\overline{\text{FWD}}$/REV From MECHACON
6
5
4
3
2
1
A
B
C
E
F
G
H

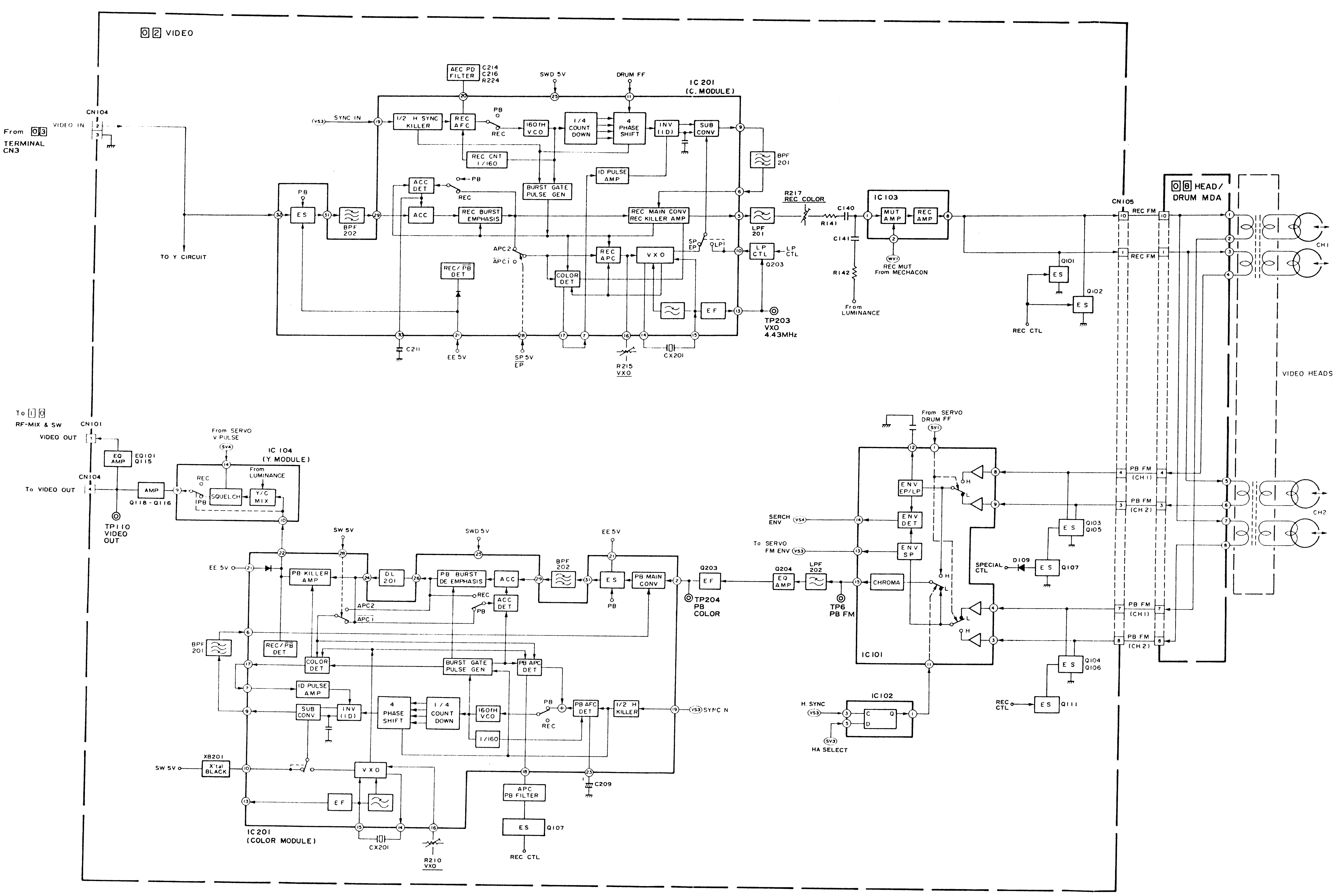
4.8 TUNER/IF BLOCK DIAGRAM


1 0 MIX BOUSTOR
ANT IN
DIV
MIX
RF OUT
0 4 TU/IF
U/V TUNER
ANT IN
UB
VHB
VLB
AGC
TU
AFC
IF
FILTER (SAW)
IC-1
SOUND DET
VIF AMP
VIDEO DET
AFC
IF AFC
RF AGC
TP 1 AGC
RF AGC
R10
8
9
24
28
30
2
1
17
24
IC2,Q13,Q14
AFC CTL
CH SELECT LOGIC
Q15~Q19
AUDIO LEVEL
R40
Q8
AUDIO MUTE
CF3 5.5MHz
Q2,Q3
VIDEO SHAPPER
R32
COLOR LEVEL
SYNC DET
Q5~Q7
CN3
3
AUDIO OUT
1
VIDEO OUT
CN3
TO TERMINAL 0 3 CN2
IC5
CHANNEL DATA MEMORY
2
6
7
8
9
12
1
IC4
5~8
13,30
11
25
24
28
19
22
23
20
18
17
16
CPU
12
26
21
4
3
2
1
CN1
FROM/TO TIMER 3 4 CN3
1 BUSY
2 TUNER RESET
3 TU DATA ENABLE
4 ADD DATA 0
5 ADD DATA 1
6 ADD DATA 2
7 ADD DATA 3
Q22~Q25
POWER FAILURE CONTROL
IC3
AFC DET LOGIC
AFC D-A CONV
IC3,Q26
TUNNING DET
FROM POWER SUPPLY 0 1 CN1
CN2
-30V
AL 12V
+45V
4
Q4
Q27
45V REG
IC2,Q12
TUNNING D-A CONV
DATA BAS

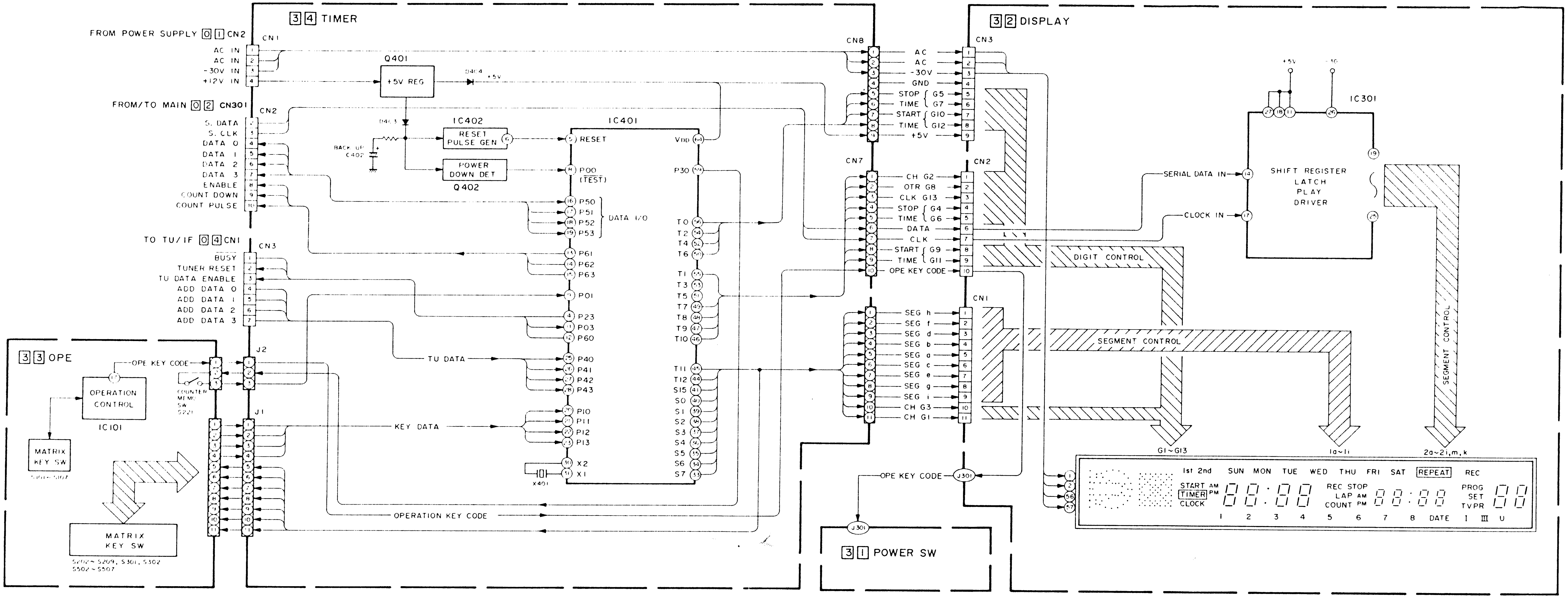
4.9 VIDEO (Y) BLOCK DIAGRAM


02 VIDEO (Y)
From 03 TERMINAL CN3
CN104
VIDEO IN
C217
E-E 5V
SYNC
TP104
NC
IC 103 (Y. MODULE)
AGC DET
DELAY & MIX
SYNC SEP
W/D CLIP
KEYED AGC
EE
PB
SUB CLAMP
EE AMP
CLAMP
NONLINEAR MIX
MAIN PREEMP
FREQ MOD
12dB AMP
NLN EMP/DEEMP
DRUM FF
C166
SWD 5V
C167
LPF 101
C155
(SV2)
COLOR ROTARY From SERVO
From LPF 202 REC COLOR
L113,C159
HPF
R175 REC FM
Q122
EF
IC103
MUT AMP
REC AMP
Q205
(MV1)
REC MUT From MECHACON
CN101
REC FM
Q101
ES
Q102
REC CTL
08 HEAD/ DRUM MDA
CH1
VIDEO HEADS
EE SIGNAL PATH
REC SIGNAL PATH
PB SIGNAL PATH
From SERVO DRUM FF
(SV1)
IC 101
ENV SERCH
ENV DET
ENV
SERCH FM ENV
(SV4)
To SERVO FM ENV
(SV3)
PB FM (CH1)
PB FM (CH2)
Q103 Q105
CH2
D109
Q107
SPECIAL CTL
AGC AMP
AGC DET
EQ AMP
R130 SHAPNESS
Q108 - Q110
C125 C126 L105
ROTARY TRANSFORMERS
Q104 Q106
REC CTL
Q111
IC102
SYNC IN (VS3)
(VS3)
HA SELECT
From MECHACON N CANCEL
D111
C153
C165
C181
PB AMP
SUB CLAMP
NLN EMP/DEEMP
NOISE LIMITER
IC 104 (Y. DODULE)
DOC DET
DC PULSE
DOC SW
DL101
1H DELAY LINE
CLAMP
NLN MIX
12dB AMP
NOISE CANCEL
LIMI- TER
DOUBLE LIMITER
FREQ DEMOD
NOISE LIMITER
SQUELCH
Y/C MIX
VIDEO OUT TP110
TO TERMINAL 03 CN3
CN104
Q118 - Q116
VIDEO AMP
Q115
EQ AMP
LPF101
TO 10 RF CONV/MIX BOOSTOR
CN101
IC105
HPA
LPA
SHARPNESS CTL
DE EMP
AMP
NOISE CANCEL
NOISE DET
L111
L120
C164
(VS4)
V PULSE From SERVO
PB COLOR
COLOR ROTARY From SERVO
(SV2)
Q122
CARR CTL
PB 5V
A
B
C
E
F
G
1
2
3
4
5
6

4.10 VIDEO (COLOR) BLOCK DIAGRAM

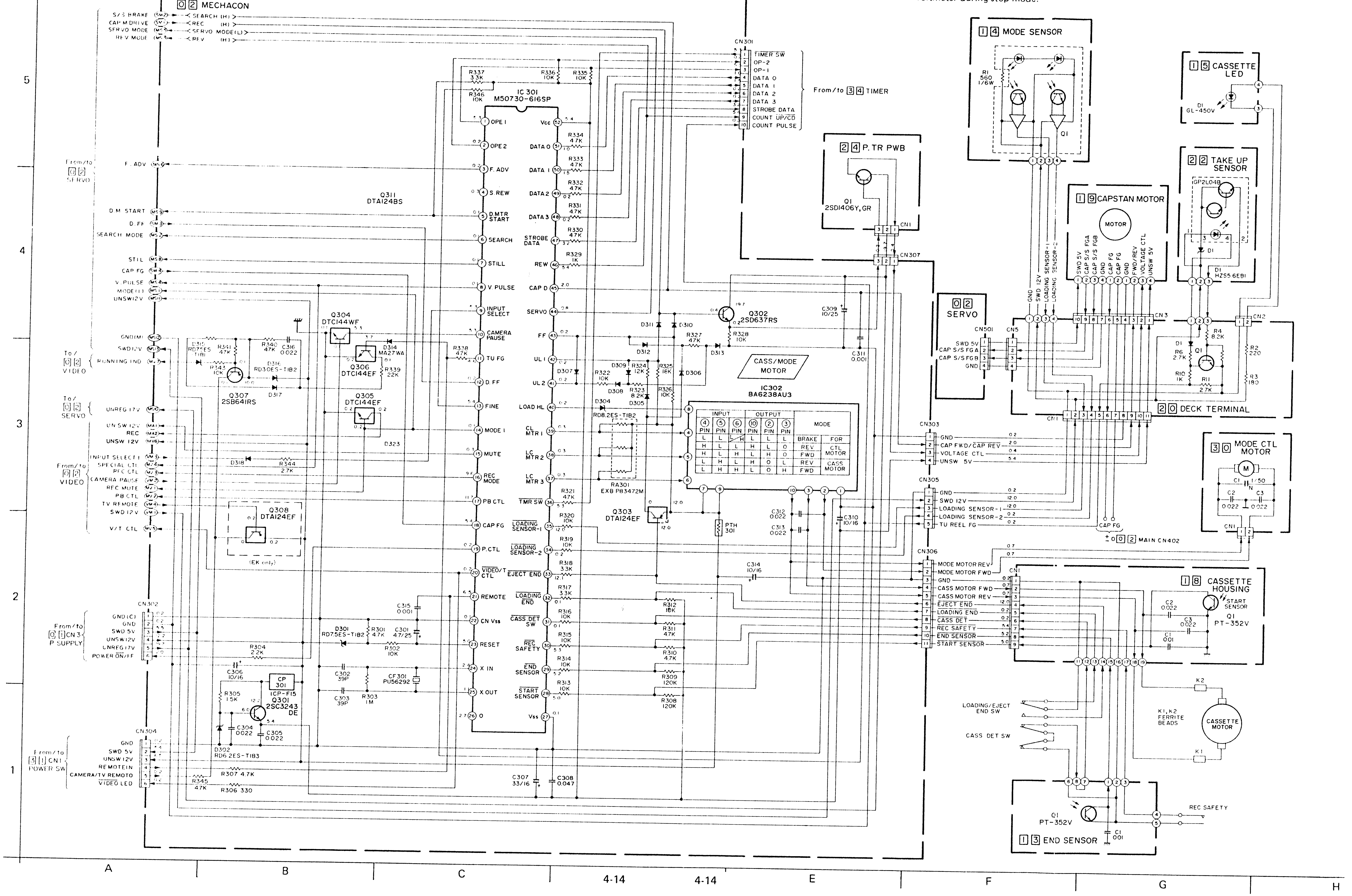

02 VIDEO
From 03 TERMINAL CN3
CN104
VIDEO IN
TO Y CIRCUIT
AEC PD FILTER
C214 C216 R224
SWD 5V
DRUM FF
IC 201 (C. MODULE)
SYNC IN
1/2 H SYNC KILLER
REC AFC
PB
REC
160fH VCO
1/4 COUNT DOWN
4 PHASE SHIFT
INV (ID)
SUB CONV
REC CNT 1/160
BPF 201
ACC DET
ID PULSE AMP
BURST GATE PULSE GEN
ES
BPF 202
ACC
REC BURST EMPHASIS
REC MAIN CONV REC KILLER AMP
LPF 201
R217 REC COLOR
C140
R141
C141
R142
From LUMINANCE
IC 103
MUT AMP
REC AMP
REC MUT From MECHACON
APC2
APC1
REC/PB DET
COLOR DET
REC APC
VXO
SP EP
QLP1
LP CTL
Q203
EF
TP203 VXO 4.43MHz
C211
EE 5V
SP 5V EP
R215 VXO
CX201
CN105
REC FM
08 HEAD/ DRUM MDA
CH1
CH2
Q101
Q102
REC CTL
VIDEO HEADS
To 10 RF-MIX & SW
CN101
VIDEO OUT
EQ AMP
EQ101 Q115
To VIDEO OUT
AMP
Q118-Q116
TP110 VIDEO OUT
From SERVO V PULSE
IC 104 (Y MODULE)
From LUMINANCE
SQUELCH
Y/C MIX
SW 5V
EE 5V
PB KILLER AMP
DL 201
PB BURST DE EMPHASIS
BPF 202
PB MAIN CONV
Q203
TP204 PB COLOR
Q204
EQ AMP
LPF 202
TP6 PB FM
From SERVO DRUM FF
SERCH ENV
To SERVO FM ENV
ENV EP/LP
ENV DET
ENV SP
CHROMA
IC101
SPECIAL CTL
D109
Q107
PB FM (CH1)
PB FM (CH2)
Q103 Q105
Q104 Q106
Q111
H. SYNC
IC102
HA SELECT
BPF 201
REC/PB DET
COLOR DET
BURST GATE PULSE GEN
PB APC DET
ID PULSE AMP
SUB CONV
INV (ID)
4 PHASE SHIFT
1/4 COUNT DOWN
160fH VCO
1/160
PB AFC DET
1/2 H KILLER
SYNC N
XB201 X'tal BLACK
VXO
EF
IC201 (COLOR MODULE)
CX201
R210 VXO
APC PB FILTER
ES
Q107
REC CTL
C209

4.11 TIMER DISPLAY/PRESETTER BLOCK DIAGRAMS

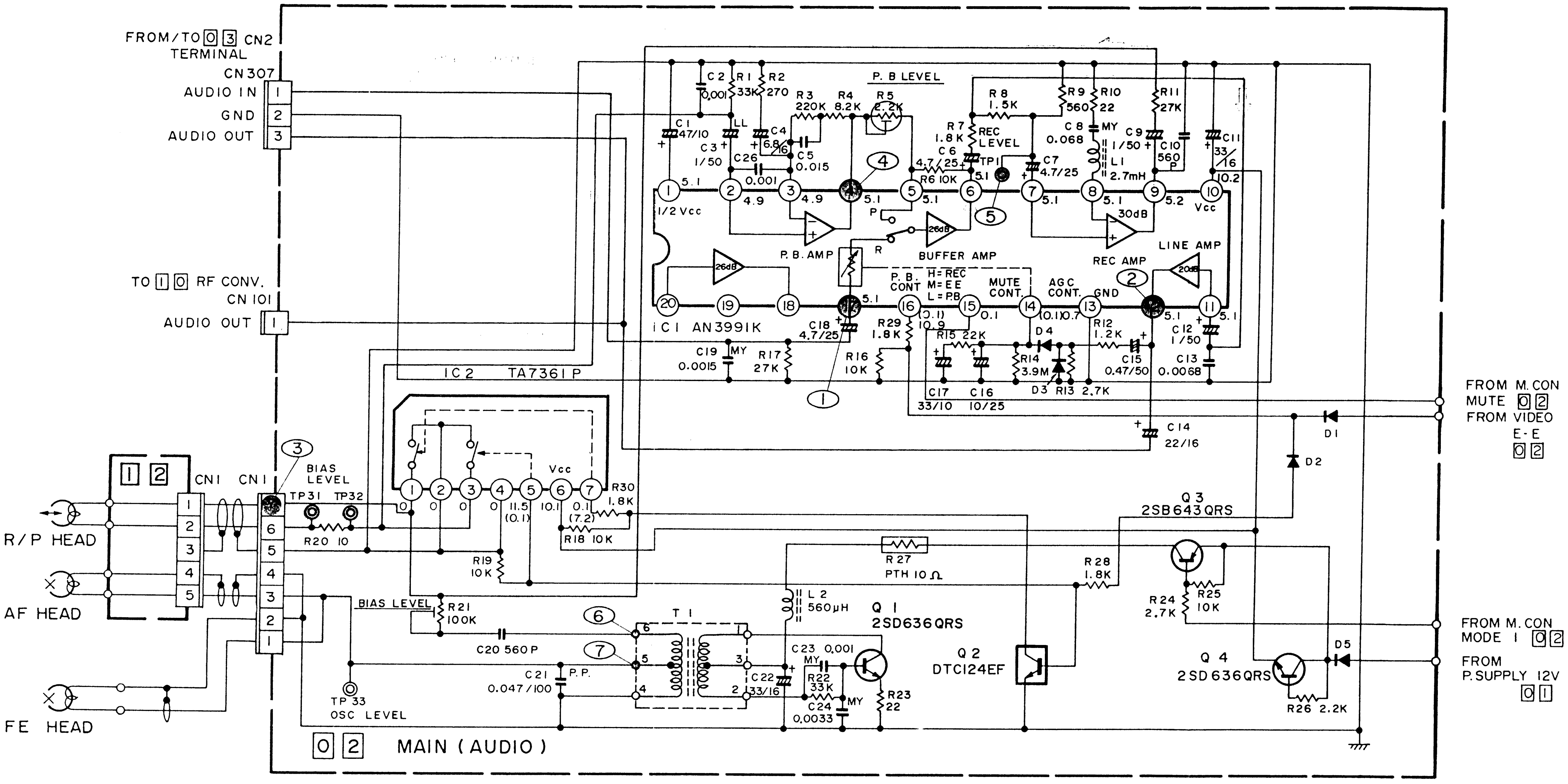

3 4 TIMER
FROM POWER SUPPLY 0 1 CN2
CN1
AC IN
AC IN
-30V IN
+12V IN
Q401
+5V REG
D404
+5V
FROM/TO MAIN 0 2 CN301
CN2
S. DATA
S. CLK
DATA 0
DATA 1
DATA 2
DATA 3
ENABLE
COUNT DOWN
COUNT PULSE
D403
BACK UP C402
IC402
RESET PULSE GEN
POWER DOWN DET
Q402
IC401
RESET
VDD
P00 (TEST)
P30
P50
P51
P52
P53
DATA I/O
TO TU/IF 0 4 CN1
CN3
BUSY
TUNER RESET
TU DATA ENABLE
ADD DATA 0
ADD DATA 1
ADD DATA 2
ADD DATA 3
P61
P62
P63
P01
P23
P03
P60
TU DATA
P40
P41
P42
P43
KEY DATA
P10
P11
P12
P13
X2
X1
X401
T0
T2
T4
T6
T1
T3
T5
T7
T8
T9
T10
T11
T12
S15
S0
S1
S2
S3
S4
S5
S6
S7
OPERATION KEY CODE
3 3 OPE
OPE KEY CODE
OPERATION CONTROL
IC101
COUNTER MEMO SW S221
J2
J1
MATRIX KEY SW
S101~S107
MATRIX KEY SW
S202~S209, S301, S302
S502~S507
CN8
AC
AC
-30V
GND
STOP { G5
TIME { G7
START { G10
TIME { G12
+5V
CN7
CH G2
OTR G8
CLK G13
STOP { G4
TIME { G6
DATA
CLK
START { G9
TIME { G11
OPE KEY CODE
SEG h
SEG f
SEG d
SEG b
SEG a
SEG c
SEG e
SEG g
SEG i
CH G3
CH G1
3 2 DISPLAY
CN3
CN2
CN1
+5V
IC301
SERIAL DATA IN
CLOCK IN
SHIFT REGISTER LATCH PLAY DRIVER
DIGIT CONTROL
SEGMENT CONTROL
SEGMENT CONTROL
G1~G13
1a~1i
2a~2i, m, k
OPE KEY CODE
J301
J301
3 1 POWER SW
1st 2nd SUN MON TUE WED THU FRI SAT REPEAT REC
START AM
TIMER PM
CLOCK
REC STOP
LAP AM
COUNT PM
PROG
SET
TVPR
1 2 3 4 5 6 7 8 DATE I III U

4.12 MECHACON SCHEMATIC DIAGRAM

NOTES:
1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.
2. Voltages are DC-measured with a digital voltmeter during stop mode.


02 MECHACON
S/S BRAKE
CAP M DRIVE
SERVO MODE
REV MODE
SEARCH (H)
REC (H)
SERVO MODE (L)
REV (H)
IC301 M50730-616SP
R337 3.3K
R346 10K
R336 10K
R335 10K
OPE 1
OPE 2
F. ADV
S. REW
D.MTR START
SEARCH
STILL
V. PULSE
INPUT SELECT
CAMERA PAUSE
TU FG
D. FF
FINE
MODE 1
MUTE
REC MODE
PB CTL
CAP FG
P.CTL
VIDEO/T CTL
REMOTE
CN Vss
RESET
X IN
X OUT
Vcc
DATA 0
DATA 1
DATA 2
DATA 3
STROBE DATA
REW
CAP D
SERVO
FF
UL 1
UL 2
LOAD HL
CL MTR 1
LC MTR 2
LC MTR 3
TMR SW
LOADING SENSOR-1
LOADING SENSOR-2
EJECT END
LOADING END
CASS DET SW
REC SAFETY
END SENSOR
START SENSOR
Vss
CN301
TIMER SW
OP-2
OP-1
DATA 0
DATA 1
DATA 2
DATA 3
STROBE DATA
COUNT UP/CD
COUNT PULSE
From/to 34 TIMER
From/to 02 SERVO
F. ADV
D.M. START
D. FF
SEARCH MODE
STILL
CAP FG
V. PULSE
MODE (1)
UNSW12V
Q311 DTA124BS
R334 4.7K
R333 4.7K
R332 4.7K
R331 4.7K
R330 4.7K
R329 1K
To/ 02 VIDEO
GND(M)
SWD12V
RUNNING IND
To/ 02 SERVO
UNREG 17V
From/to 02 VIDEO
UN SW 12V
REC
UNSW 12V
INPUT SELECT
SPECIAL CTL
REC CTL
CAMERA PAUSE
REC MUTE
PB CTL
TV REMOTE
SWD 12 V
V/T CTL
Q304 DTC144WF
Q306 DTC144EF
Q305 DTC144EF
Q307 2SB641RS
Q308 DTA124EF
(EK only)
D315 RD7.5ES-T1B1
R341 47K
R343 10K
R340 47K
C316 0.022
D314 MA27WA
D316 RD30ES-T1B2
D317
R339 22K
R338 47K
D318
R344 2.7K
D323
Q302 2SD637RS
D311
D310
D312
D313
R327 47K
R328 10K
C309 10/25
C311 0.001
D309
R324 12K
R325 18K
D306
R322 10K
D308
R323 8.2K
D305
R326 10K
D307
D304 RD8.2ES-T1B2
RA301 EXB P83472M
CASS/MODE MOTOR
IC302 BA6238AU3
INPUT
OUTPUT
MODE
④ PIN
⑤ PIN
⑥ PIN
⑩ PIN
② PIN
③ PIN
L L L L L L BRAKE
H L L H L O REV
H H L H L O FWD
L L H L O L REV
L H H L O H FWD
FOR CTL MOTOR
CASS MOTOR
R321 47K
R320 10K
R319 10K
R318 3.3K
R317 3.3K
R316 10K
R315 10K
R314 10K
R313 10K
R312 10K
R311 47K
R310 47K
R309 120K
R308 120K
Q303 DTA124EF
PTH 301
C312 0.022
C313 0.022
C310 10/16
C314 10/16
C315 0.001
D301 RD7.5ES-T1B2
R301 4.7K
C301 47/25
R302 10K
C302 39P
CF301 PU56292
C303 39P
R303 1M
C306 10/16
R305 1.5K
CP 301 ICP-F15
Q301 2SC3243 DE
C304 0.022
C305 0.022
D302 RD6.2ES-T1B3
R304 2.2K
CN302
From/to 01 CN3 P SUPPLY
GND(C)
GND
SWD 5V
UNSW12V
UNREG17V
POWER ON/FF
CN304
From/to 31 CN1 POWER SW
GND
SWD 5V
UNSW12V
REMOTEIN
CAMERA/TV REMOTO
VIDEO LED
R345 4.7K
R307 4.7K
R306 330
C307 33/16
C308 0.047
14 MODE SENSOR
R1 560 1/6W
Q1
15 CASSETTE LED
D1 GL-450V
24 P.TR PWB
Q1 2SD1406Y,GR
CN1
CN307
19 CAPSTAN MOTOR
MOTOR
SWD 5V
CAP S/S FGA
CAP S/S FGB
GND
CAP FG
GND
FWD/REV
VOLTAGE CTL
UNSW 5V
GND
SWD 12V
LOADING SENSOR-1
LOADING SENSOR-2
22 TAKE UP SENSOR
GP2L04B
D1
D1 HZS5.6EB1
02 SERVO
CN501
CN5
SWD 5V
CAP S/S FGA
CAP S/S FGB
GND
CN3
CN2
R4 8.2K
R2 220
R3 180
R6 2.7K
R10 1K
R11 2.7K
20 DECK TERMINAL
CN303
GND
CAP FWD/CAP REV
VOLTAGE CTL
UNSW 5V
CN305
GND
SWD 12V
LOADING SENSOR-1
LOADING SENSOR-2
TU REEL FG
CAP FG
to 02 MAIN CN402
30 MODE CTL MOTOR
M
C1 1/50
C2 0.022
C3 0.022
CN306
MODE MOTOR REV
MODE MOTOR FWD
GND
CASS MOTOR FWD
CASS MOTOR REV
EJECT END
LOADING END
CASS DET
REC SAFETY
END SENSOR
START SENSOR
18 CASSETTE HOUSING
C2 0.022
C3 0.022
C1 .001
START SENSOR
Q1 PT-352V
K2
K1
K1,K2 FERRITE BEADS
CASSETTE MOTOR
LOADING/EJECT END SW
CASS DET SW
Q1 PT-352V
C1 .001
13 END SENSOR
REC SAFETY
A
B
C
E
F
G
H
1
2
3
4
5
6

4.13 MAIN (AUDIO SECTION) SCHEMATIC DIAGRAM


FROM/TO 03 CN2 TERMINAL
CN307
AUDIO IN
GND
AUDIO OUT
TO 10 RF CONV. CN 101
AUDIO OUT
12
CN1
CN1
R/P HEAD
AF HEAD
FE HEAD
③ BIAS LEVEL
TP31 TP32
R20 10
IC2 TA7361P
Vcc
R30 1.8K
R18 10K
R19 10K
BIAS LEVEL
R21 100K
C20 560P
TP33 OSC LEVEL
C21 0.047/100
P.P.
T1
⑥
⑦
L2 560μH
C22 33/16
C23 0.001 MY
R22 33K
C24 0.0033 MY
R23 22
Q1 2SD636QRS
Q2 DTC124EF
R27 PTH 10Ω
R28 1.8K
Q3 2SB643QRS
R24 2.7K
R25 10K
Q4 2SD636QRS
R26 2.2K
D1
D2
D5
C14 22/16
IC1 AN3991K
C1 47/10
C2 0.001
C3 1/50
C26 0.001
R1 33K
R2 270
R3 220K
R4 8.2K
R5 2.2K
P.B LEVEL
C4 6.8/16
C5 0.015
R6 10K
R7 1.8K REC LEVEL
C6 4.7/25
TP1
C7 4.7/25
R8 1.5K
R9 560
R10 22
C8 0.068 MY
C9 1/50
L1 2.7mH
R11 27K
C10 560P
C11 33/16
1/2 Vcc
P.B. AMP
BUFFER AMP
REC AMP
LINE AMP
30dB
26dB
20dB
P.B. CONT H=REC M=EE L=PB
MUTE CONT.
AGC CONT.
GND
C18 4.7/25
C19 0.0015 MY
R17 27K
R16 10K
R29 1.8K
R15 22K
C17 33/10
C16 10/25
R14 3.9M
D3
D4
R13 2.7K
R12 1.2K
C15 0.47/50
C12 1/50
C13 0.0068
FROM M.CON MUTE 02
FROM VIDEO E-E 02
FROM M.CON MODE 1 02
FROM P.SUPPLY 12V 01
02 MAIN (AUDIO)
A B C E F G H
1 2 3 4 5 6

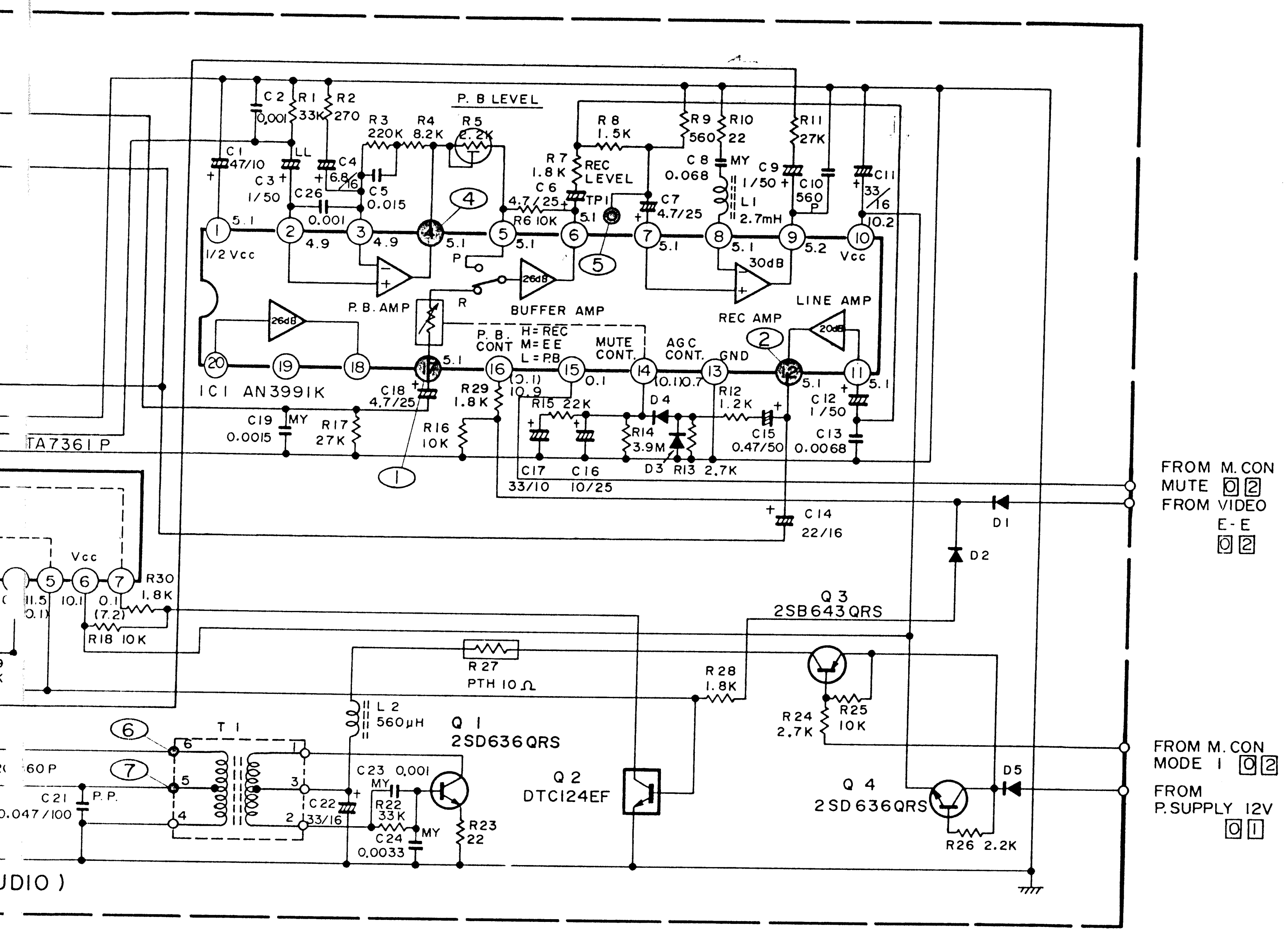
RECORDING SIGNAL PATH

PLAYBACK SIGNAL PATH

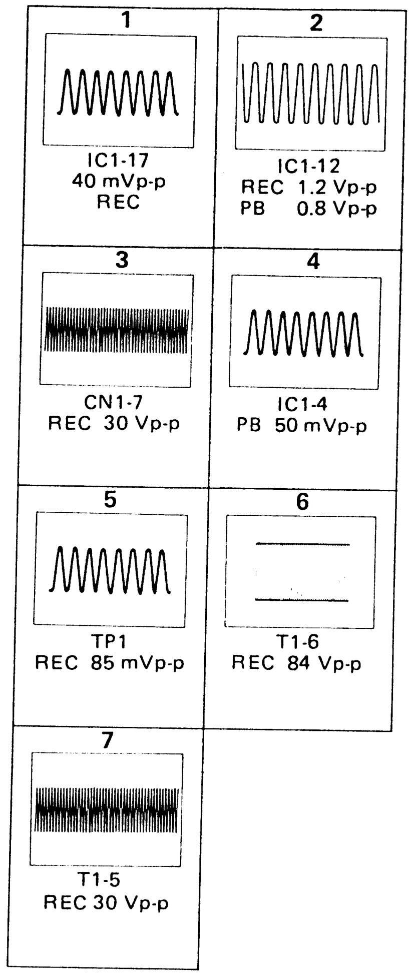
REC/PLAY SIGNAL PATH

NOTE: Shaded (

Replace o


P. B LEVEL
C2 0.001
R1 33K
R2 270
R3 220K
R4 8.2K
R5 2.2K
C1 47/10
C3 1/50
C4 6.8/16
C5 0.015
C26 0.001
R8 1.5K
R9 560
R10 22
R11 27K
R7 1.8K
REC LEVEL
C6 4.7/25
R6 10K
TP1
C7 4.7/25
C8 0.068
MY
L1 2.7mH
C9 1/50
C10 560P
C11 33/16
1/2 Vcc
Vcc
P. B. AMP
BUFFER AMP
REC AMP
LINE AMP
30dB
26dB
20dB
P
R
P. B. CONT
H=REC
M=EE
L=P.B
MUTE CONT.
AGC CONT.
GND
IC1 AN3991K
C18 4.7/25
C19 0.0015
R17 27K
R16 10K
R29 1.8K
R15 22K
D4
R14 3.9M
D3
R13 2.7K
R12 1.2K
C15 0.47/50
C12 1/50
C13 0.0068
C17 33/10
C16 10/25
C14 22/16
TA7361 P
Vcc
R30 1.8K
R18 10K
D1
D2
Q3 2SB643QRS
R27 PTH 10 Ω
R28 1.8K
R24 2.7K
R25 10K
L2 560μH
T1
Q1 2SD636QRS
Q2 DTC124EF
Q4 2SD636QRS
D5
C23 0.001 MY
R22 33K
C24 0.0033 MY
R23 22
C22 33/16
C21 0.047/100
P.P.
60P
R26 2.2K
(AUDIO)
FROM M.CON MUTE 02
FROM VIDEO E-E 02
FROM M.CON MODE 1 02
FROM P.SUPPLY 12V 01

— Waveforms of audio circuit —



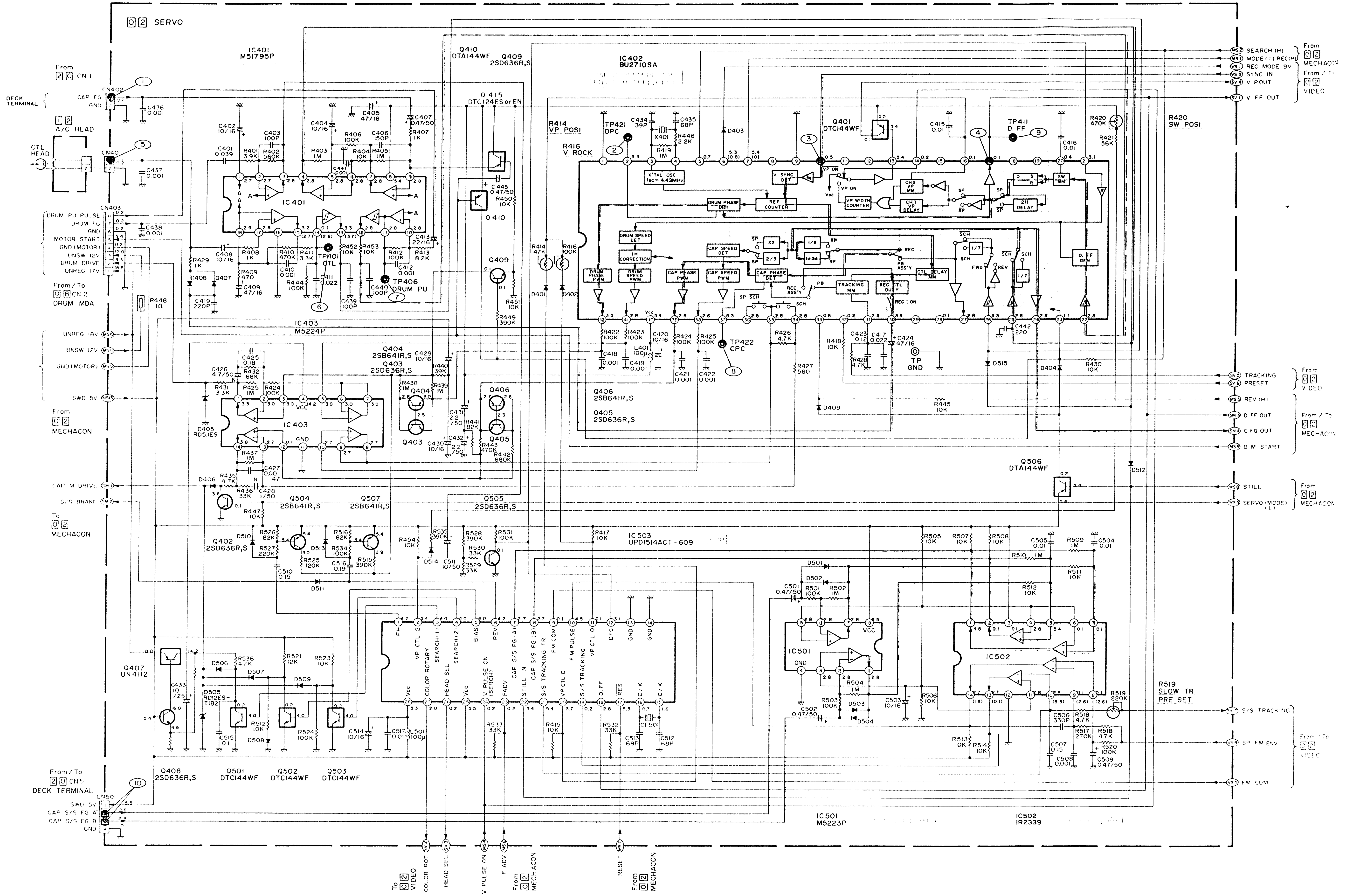
RECORDING SIGNAL PATH

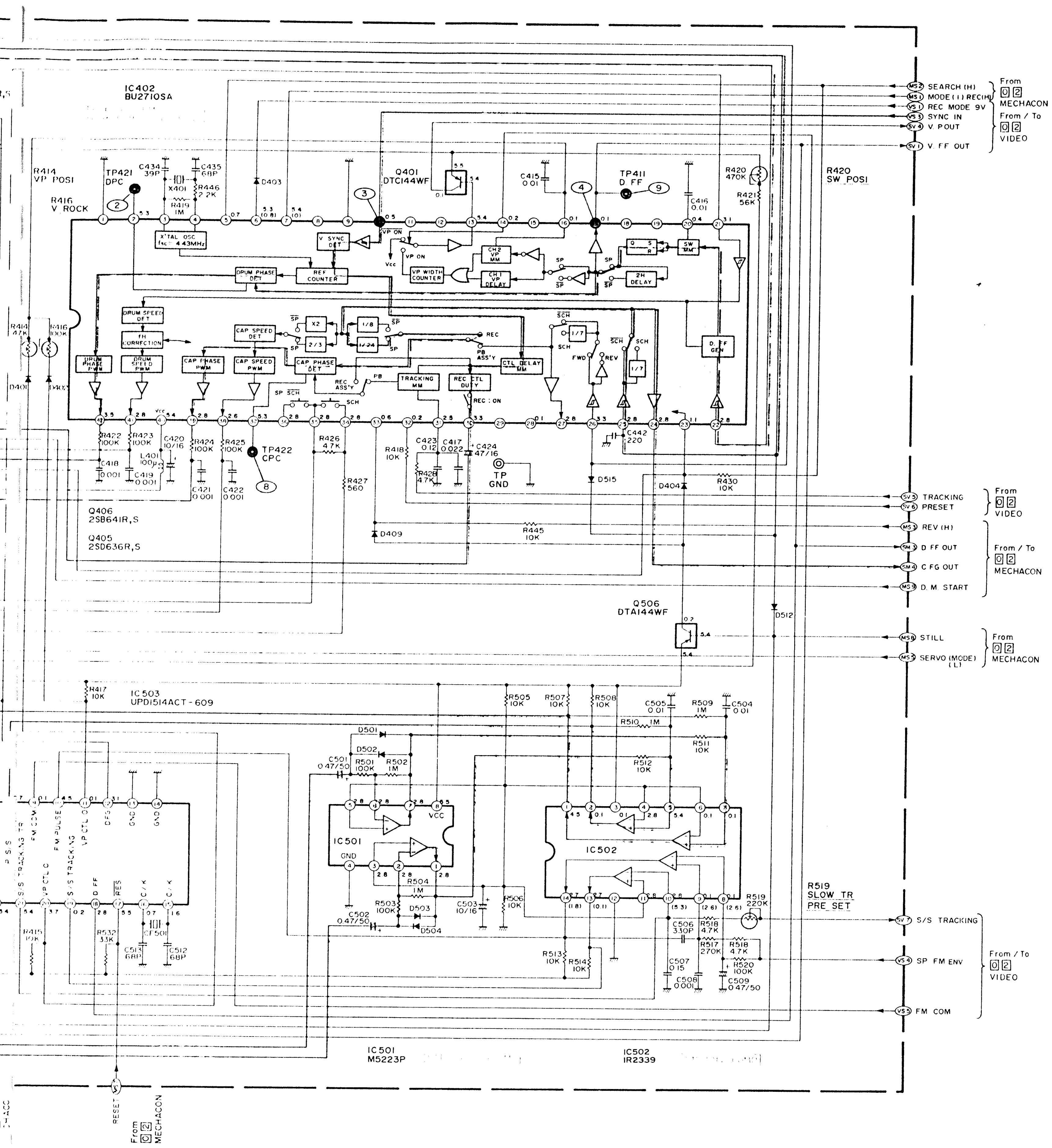
PLAYBACK SIGNAL PATH

REC / PLAY SIGNAL PATH

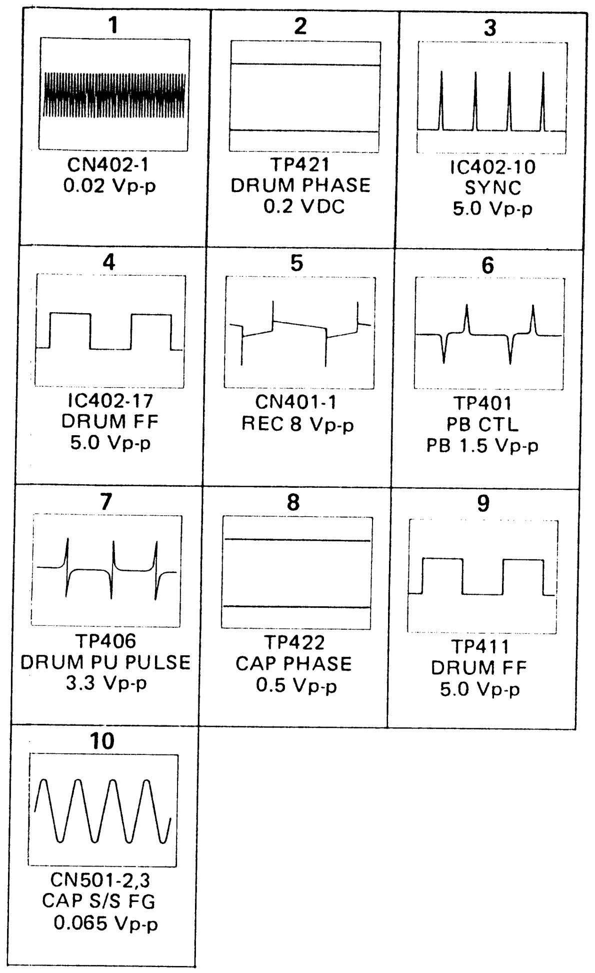
NOTE: Shaded ( ) parts are critical for safety.
Replace only with specified part numbers.

4.14 SERVO SCHEMATIC DIAGRAM


02 SERVO
IC401 M51795P
Q410 DTA144WF
Q409 2SD636R,S
Q415 DTC124ES or EN
IC402 BU2710SA
From 20 CN1
DECK TERMINAL
CAP FG
GND
CN402
C436 0.001
02 A/C HEAD
CTL HEAD
CN401
C437 0.001
CN403
DRUM PU PULSE
DRUM FG
GND
MOTOR START
GND (MOTOR)
UNSW 12V
DRUM DRIVE
UNREG 17V
C438 0.001
From / To 06 CN2 DRUM MDA
R448 1Ω
UNREG 18V
UNSW 12V
GND (MOTOR)
SWD 5V
From 02 MECHACON
CAP M DRIVE
S/S BRAKE
To 02 MECHACON
C402 10/16
C403 100P
C401 0.039
R401 3.9K
R402 560K
C404 10/16
C405 47/16
C406 150P
R406 100K
R403 1M
R404 10K
R405 1M
C441 0.001
C407 0.47/50
R407 1K
C445 0.47/50
R450 10K
Q410
C413 22/16
R429 1K
C408 10/16
R408 1K
R409 470
C409 47/16
R410 470K
C410 0.001
R411 3.3K
R444 100K
TP401 CTL
C411 0.022
R452 100K
R453 10K
R412 100K
R413 8.2K
C412 0.001
C440 100P
TP406 DRUM PU
C439 100P
D406
D407
C419 220P
IC403 M5224P
R451 10K
R449 390K
Q404 2SB641R,S
Q403 2SD636R,S
C429 10/16
R440 39K
R439 1M
R438 1M
C425 0.18
R432 68K
C426 4.7/50
R431 3.3K
R425 1M
R424 100K
D405 RD51ES
IC403
R437 1M
C427 0.001 47
R435 4.7K
R436 33K
C428 1/50
D406
Q504 2SB641R,S
Q507 2SB641R,S
Q505 2SD636R,S
R447 10K
Q402 2SD636R,S
D510
R526 82K
R527 220K
C510 0.15
R525 120K
D513
R516 82K
R534 100K
C516 0.19
R515 390K
D511
Q406 2SB641R,S
Q405 2SD636R,S
C431 2.2/50
R441 82K
C430 10/16
C432 2.2/50
R443 470K
R442 680K
R414 VP POSI
R416 V ROCK
TP421 DPC
C434 39P
X401
R419 1M
C435 68P
R446 2.2K
D403
Q401 DTC144WF
C415 0.01
TP411 D.FF
R420 470K
R421 56K
C416 0.01
R420 SW POSI
X'TAL OSC fsc=4.43MHz
V. SYNC DET
VP ON
REF COUNTER
VP WIDTH COUNTER
CH2 VP MM
CH1 VP DELAY
SW MM
2H DELAY
DRUM PHASE DET
DRUM SPEED DET
FM CORRECTION
DRUM PHASE PWM
DRUM SPEED PWM
CAP SPEED DET
CAP PHASE PWM
CAP SPEED PWM
CAP PHASE DET
X2
2/3
1/8
1/24
REC
PB ASS'Y
REC ASS'Y
TRACKING MM
REC CTL DUTY
REC : ON
CTL DELAY MM
SCH
1/7
FWD
REV
D. FF GEN
R414 47K
R416 100K
D401
D402
R422 100K
R423 100K
C420 10/16
C418 0.001
C419 0.001
L401 100μ
R424 100K
R425 100K
C421 0.001
C422 0.001
TP422 CPC
R426 4.7K
R427 560
R418 10K
R428 4.7K
C423 0.12
C417 0.022
C424 47/16
TP GND
C442 220
D515
D404
R430 10K
D409
R445 10K
Q506 DTA144WF
D512
SEARCH (H)
MODE (1) REC(H)
REC MODE 9V
SYNC IN
V POUT
V FF OUT
From 02 MECHACON
From / To 02 VIDEO
TRACKING
PRESET
From 02 VIDEO
REV (H)
D FF OUT
C FG OUT
D M START
From / To 02 MECHACON
STILL
SERVO (MODE) (L)
From 02 MECHACON
IC503 UPD1514ACT-609
R454 10K
R535 390K
D514
C511 10/50
R528 390K
R530 33K
R529 33K
R531 100K
R417 10K
FH
VP CTL 2
SEARCH (1)
SEARCH (2)
BIAS
REV
CAP S/S FG (A)
CAP S/S FG (B)
FM COM
FM PULSE
VP CTL 0
DFG
GND
Vcc
COLOR ROTARY
HEAD SEL
V PULSE ON (SERCH)
FADV
STILL IN
S/S TRACKING TR
VP CTL 0
S/S TRACKING
D FF
RES
C/K
R533 33K
R415 10K
R532 33K
C513 68P
CF501
C512 68P
C514 10/16
C517 0.01
L501 100μ
Q407 UN4112
R536 4.7K
D506
D507
D509
R521 12K
R523 10K
D505 RD12ES-T1B2
C433 10/25
R512 10K
D508
R524 100K
C515 0.1
Q408 2SD636R,S
Q501 DTC144WF
Q502 DTC144WF
Q503 DTC144WF
From / To 20 CN5 DECK TERMINAL
CN501
SWD 5V
CAP S/S FG A
CAP S/S FG B
GND
D501
D502
C501 0.47/50
R501 100K
R502 1M
IC501
VCC
GND
R504 1M
R503 100K
D503
D504
C502 0.47/50
C503 10/16
R506 10K
R505 10K
R507 10K
R508 10K
C505 0.01
R509 1M
C504 0.01
R510 1M
R511 10K
R512 10K
IC502
R513 10K
R514 10K
C506 330P
R518 4.7K
R517 270K
C507 0.15
C508 0.001
R518 4.7K
R520 100K
C509 0.47/50
R519 220K
R519 SLOW TR PRE SET
S/S TRACKING
SP FM ENV
FM COM
From / To 02 VIDEO
IC501 M5223P
IC502 IR2339
To 02 VIDEO
COLOR ROT
HEAD SEL
V PULSE ON
F ADV
From 02 MECHACON
RESET
From 02 MECHACON
5
4
3
2
1


IC402
BU2710SA
R414
VP POSI
R416
V ROCK
TP421
DPC
C434 39P
C435 68P
X401
R446 2.2K
R419 1M
D403
Q401
DTC144WF
C415 0.01
TP411
D FF
R420 470K
R421 56K
C416 0.01
R420
SW POSI
X'TAL OSC 4.43MHz
V SYNC DET
VP ON
VP WIDTH COUNTER
CH2 VP MM
CH1 VP DELAY
Q S R
SW MM
2H DELAY
DRUM PHASE DET
REF COUNTER
DRUM SPEED DET
FH CORRECTION
DRUM PHASE PWM
DRUM SPEED PWM
CAP PHASE PWM
CAP SPEED PWM
CAP SPEED DET
CAP PHASE DET
X2
2/3
1/8
1/24
1/7
TRACKING MM
REC CTL DUTY
CTL DELAY MM
D. FF GEN
FWD
REV
REC
PB ASS'Y
SCH
SP
R422 100K
R423 100K
C420 10/16
R424 100K
R425 100K
TP422
CPC
R426 4.7K
R418 10K
C423 0.12
C417 0.022
C424 47/16
R428 4.7K
TP GND
C442 220
C418 0.001
L401 100μ
C419 0.001
C421 0.001
C422 0.001
R427 560
D515
D404
R430 10K
Q406
2SB641R,S
Q405
2SD636R,S
D409
R445 10K
Q506
DTA144WF
D512
SEARCH (H)
MODE (1) REC(H)
REC MODE 9V
SYNC IN
V POUT
V FF OUT
From
MECHACON
From / To
VIDEO
TRACKING
PRESET
REV (H)
D FF OUT
C FG OUT
D M START
STILL
SERVO (MODE) (L)
R417 10K
IC503
UPD1514ACT-609
R505 10K
R507 10K
R508 10K
C505 0.01
R509 1M
C504 0.01
R510 1M
R511 10K
R512 10K
D501
D502
C501 0.47/50
R501 100K
R502 1M
IC501
GND
VCC
IC502
R503 100K
R504 1M
D503
D504
C502 0.47/50
C503 10/16
R506 10K
R513 10K
R514 10K
C506 330P
R518 4.7K
R517 270K
R520 100K
C507 0.15
C508 0.001
C509 0.47/50
R519 220K
R519
SLOW TR
PRE SET
S/S TRACKING
SP FM ENV
FM COM
R415 10K
R532 33K
C511 68P
CF501
C512 68P
S/S TRACKING
VP CTL
FM PULSE
D FF
RES
C/K
GND
RESET
From
MECHACON
IC501
M5223P
IC502
IR2339

— Waveforms of servo circuit —

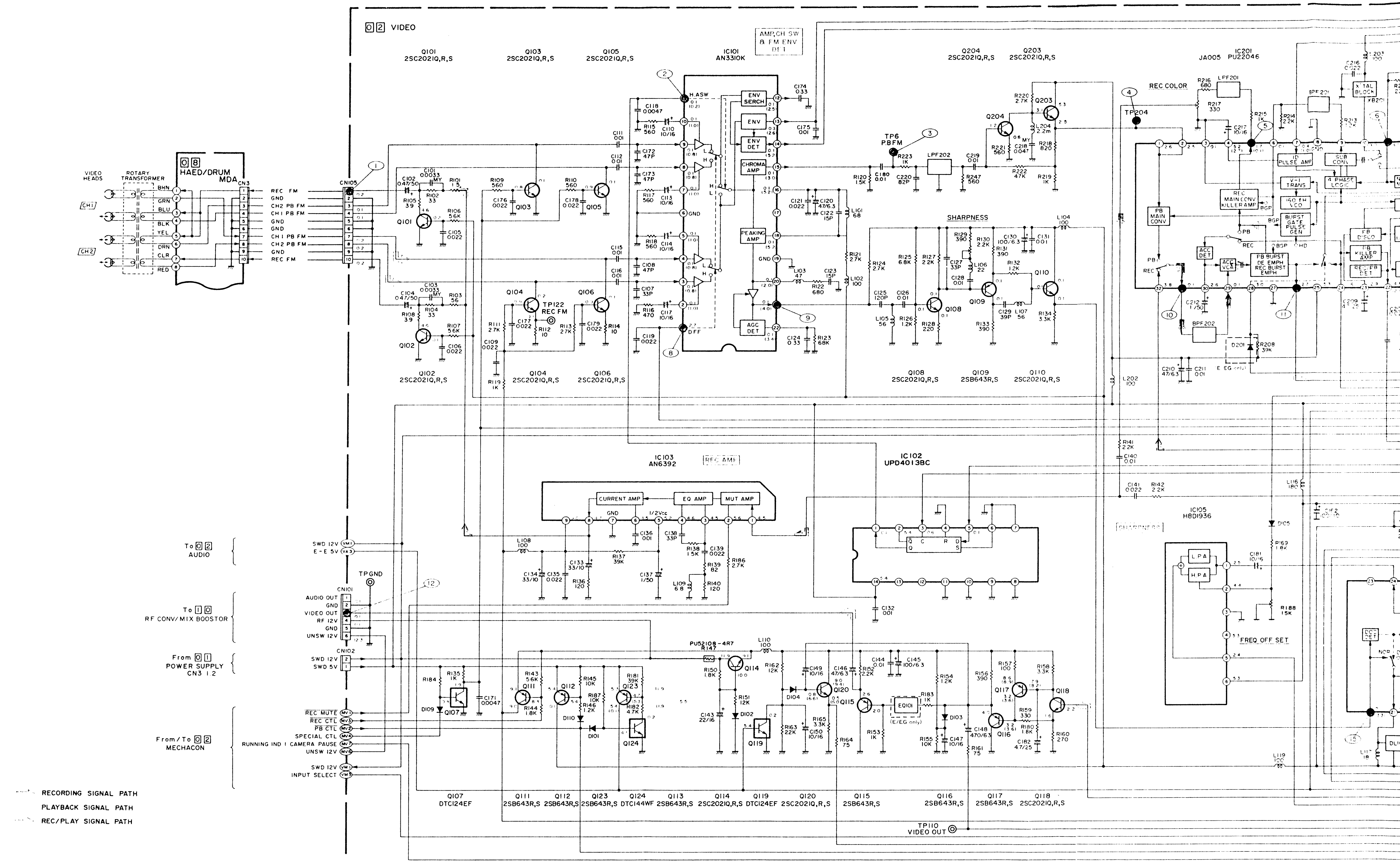


Signal flow in the schematic

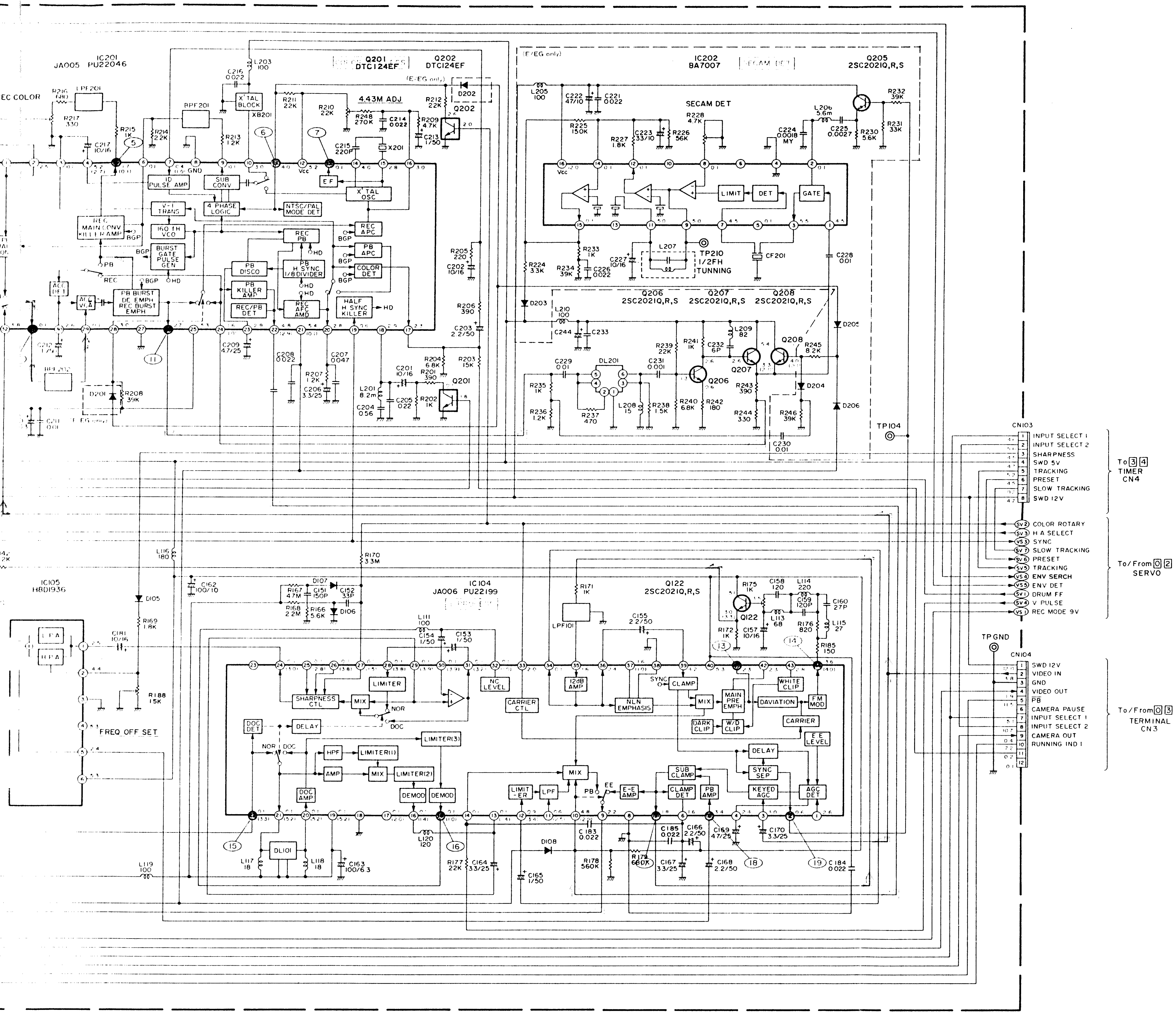
Recording signal path
Playback signal path
REC/PB signal path

NOTE: Shaded ( ) parts are critical for safety.
Replace only with specified part numbers.

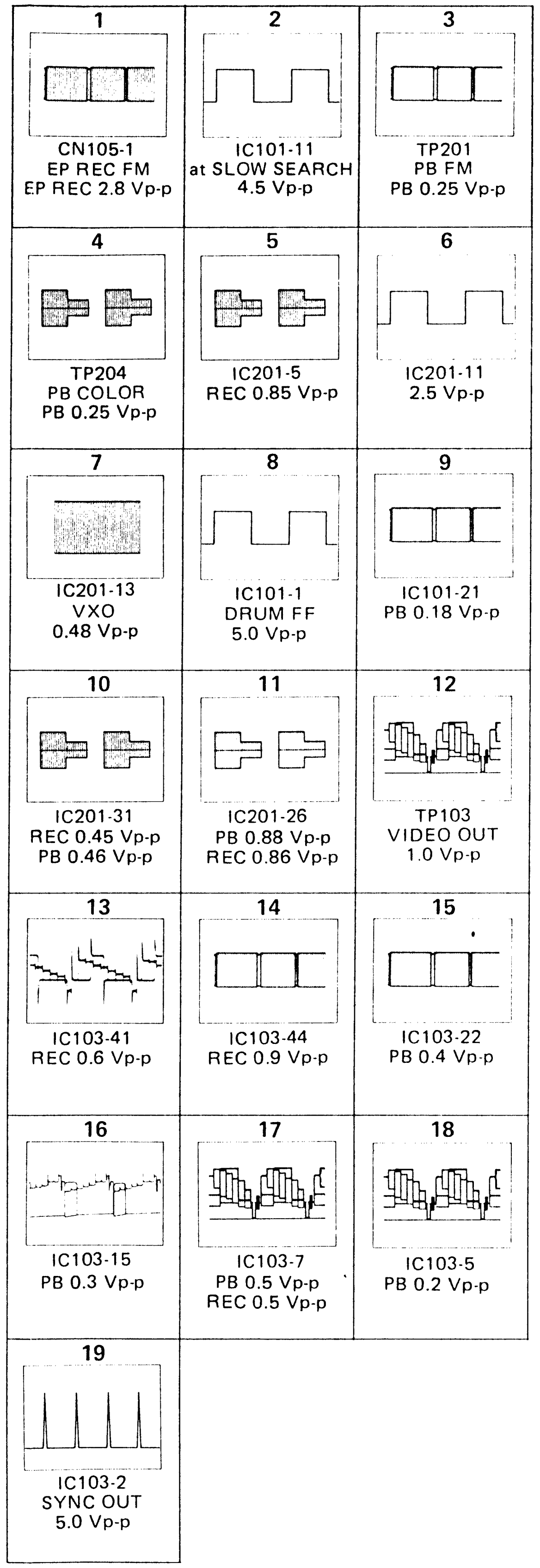
4.15 VIDEO SCHEMATIC DIAGRAM


02 VIDEO
08 HAED/DRUM MDA
VIDEO HEADS
ROTARY TRANSFORMER
CH1
CH2
BRN
GRN
BLU
BLK
YEL
ORN
CLR
RED
CN3
REC FM
GND
CH2 PB FM
CH1 PB FM
CH1 PB FM
CH2 PB FM
CN105
Q101 2SC2021Q,R,S
Q102 2SC2021Q,R,S
Q103 2SC2021Q,R,S
Q104 2SC2021Q,R,S
Q105 2SC2021Q,R,S
Q106 2SC2021Q,R,S
IC101 AN3310K
AMP,CH SW & FM ENV DET
H.ASW
ENV SERCH
ENV
ENV DET
CHROMA AMP
PEAKING AMP
AGC DET
DFF
TP122 REC FM
TP6 PBFM
LPF202
Q204 2SC2021Q,R,S
Q203 2SC2021Q,R,S
SHARPNESS
Q108 2SC2021Q,R,S
Q109 2SB643R,S
Q110 2SC2021Q,R,S
IC201 JA005 PU22046
REC COLOR
TP204
LPF201
BPF201
XTAL BLOCK
1D PULSE AMP
SUB CONV
V-I TRANS
4 PHASE LOGIC
150 FH VCO
REC MAIN CONV KILLER AMP
BURST GATE PULSE GEN
PB MAIN CONV
ACC DET
ACC VCA
PB BURST DE EMPH REC BURST EMPH
PB DISCO
PB KILLER AMP
BPF202
D201
E EG only
IC103 AN6392
REC AMP
CURRENT AMP
EQ AMP
MUT AMP
GND
1/2Vcc
IC102 UPD4013BC
IC105 H8D1936
SHARPNESS
LPA
HPA
FREQ OFF SET
To 02 AUDIO
SWD 12V
E-E 5V
TP GND
To 10 RF CONV/MIX BOOSTOR
CN101
AUDIO OUT
GND
VIDEO OUT
RF 12V
GND
UNSW 12V
From 01 POWER SUPPLY CN3 1 2
CN102
SWD 12V
SWD 5V
From/To 02 MECHACON
REC MUTE
REC CTL
PB CTL
SPECIAL CTL
RUNNING IND I CAMERA PAUSE
UNSW 12V
SWD 12V
INPUT SELECT
PU52108-4R7 R147
EQ101 (E/EG only)
Q107 DTC124EF
Q111 2SB643R,S
Q112 2SB643R,S
Q123 2SB643R,S
Q124 DTC144WF
Q113 2SB643R,S
Q114 2SC2021Q,R,S
Q119 DTC124EF
Q120 2SC2021Q,R,S
Q115 2SB643R,S
Q116 2SB643R,S
Q117 2SB643R,S
Q118 2SC2021Q,R,S
TP110 VIDEO OUT
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC/PLAY SIGNAL PATH
A
B
C
E
F
G
H
1
2
3
4
5
6

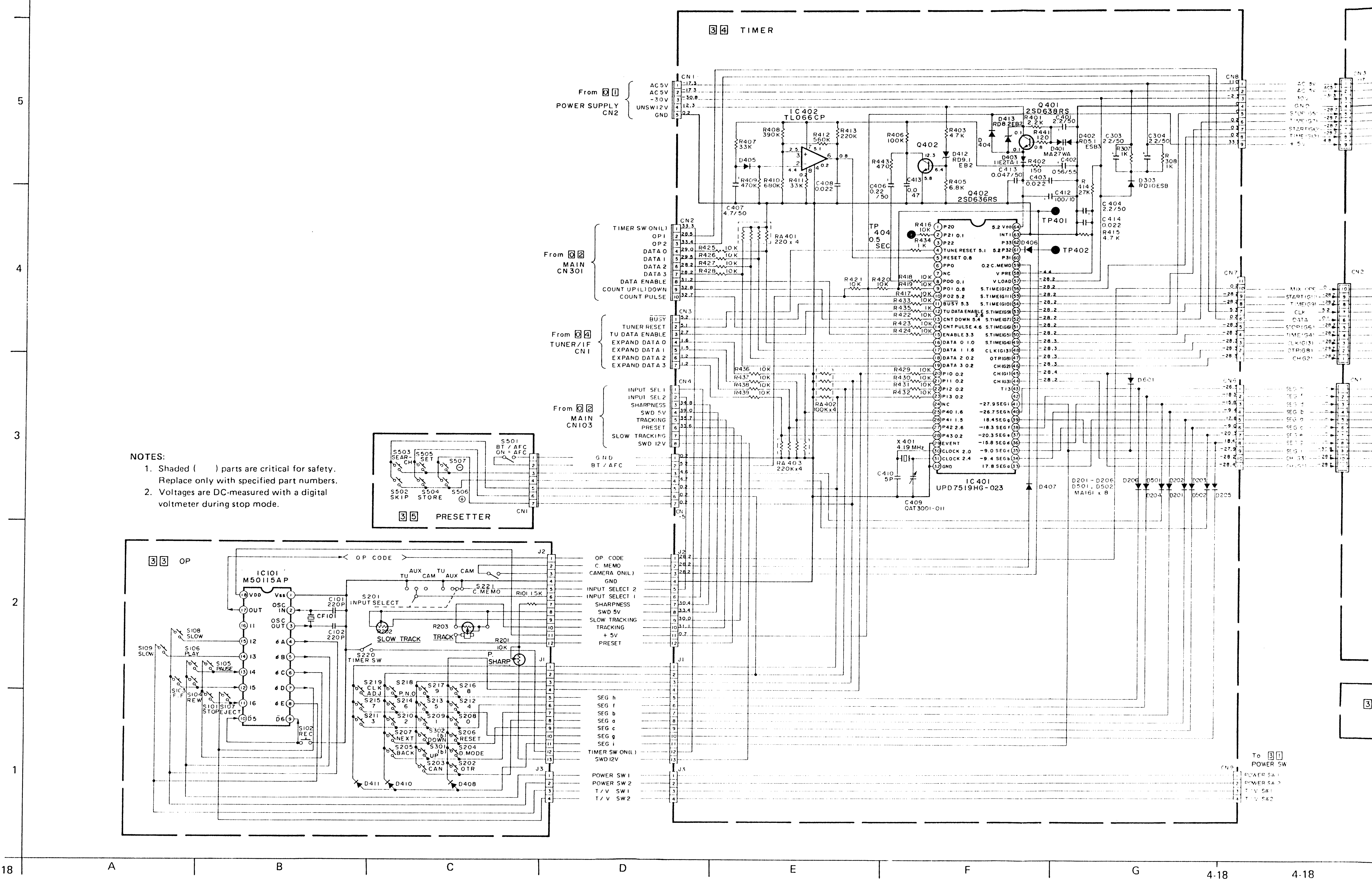
NOTE: Shaded ( ) parts are critical for safety.
Replace only with specified part numbers.


IC201 JA005 PU22046
Q201 DTC124EF
Q202 DTC124EF
IC202 BA7007
SECAM DET
Q205 2SC2021Q,R,S
4.43M ADJ
X'TAL BLOCK
XB201
TP210 1/2FH TUNNING
Q206 2SC2021Q,R,S
Q207 2SC2021Q,R,S
Q208 2SC2021Q,R,S
DL201
IC104 JA006 PU22199
Q122 2SC2021Q,R,S
IC105 HBD1936
FREQ OFF SET
TP104
TP GND
CN103
INPUT SELECT 1
INPUT SELECT 2
SHARPNESS
SWD 5V
TRACKING
PRESET
SLOW TRACKING
SWD 12V
To 3 4 TIMER CN4
COLOR ROTARY
H A SELECT
SYNC
SLOW TRACKING
PRESET
TRACKING
ENV SERCH
ENV DET
DRUM FF
V PULSE
REC MODE 9V
To/From 0 2 SERVO
CN104
SWD 12V
VIDEO IN
GND
VIDEO OUT
PB
CAMERA PAUSE
INPUT SELECT 1
INPUT SELECT 2
CAMERA OUT
RUNNING IND 1
To/From 0 3 TERMINAL CN3

— Waveforms of video circuit —

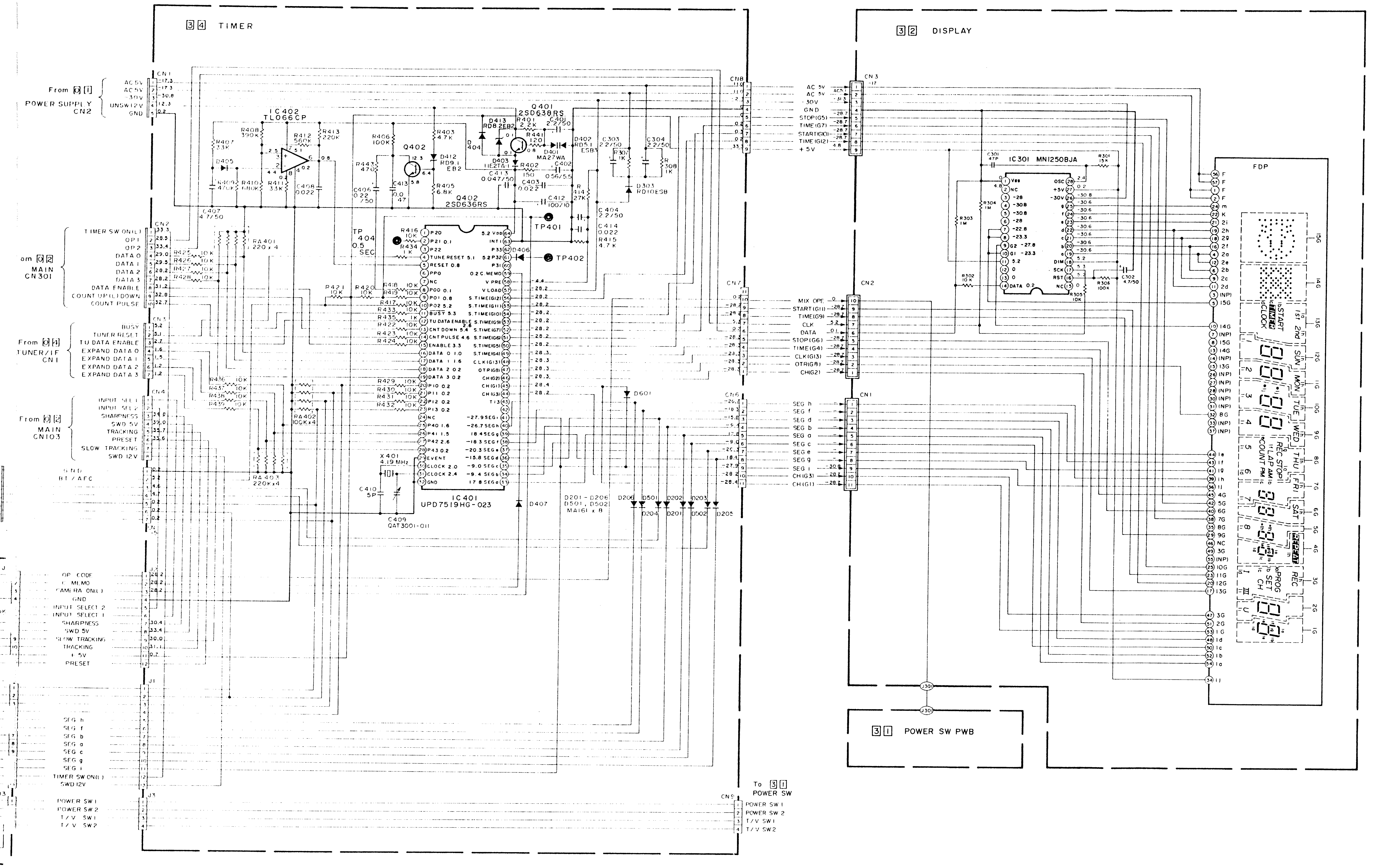


4.16 TIMER/DISPLAY SCHEMATIC DIAGRAM



34 TIMER
35 PRESETTER
33 OP
From 01 POWER SUPPLY CN2
AC5V
AC5V
-30V
UNSW12V
GND
From 02 MAIN CN301
TIMER SW ON(L)
OP1
OP2
DATA 0
DATA 1
DATA 2
DATA 3
DATA ENABLE
COUNT UP(L) DOWN
COUNT PULSE
From 04 TUNER/IF CN1
BUSY
TUNER RESET
TU DATA ENABLE
EXPAND DATA 0
EXPAND DATA 1
EXPAND DATA 2
EXPAND DATA 3
From 02 MAIN CN103
INPUT SEL 1
INPUT SEL 2
SHARPNESS
SWD 5V
TRACKING
PRESET
SLOW TRACKING
SWD 12V
IC402 TL066CP
IC401 UPD7519HG-023
Q401 2SD638RS
Q402 2SD636RS
TP401
TP402
TP 404 05 SEC
X401 4.19 MHz
C409 GAT3001-011
D201 - D206, D501, D502 MA161 x 8
D601
D407
IC101 M50115AP
OP CODE
C. MEMO
CAMERA ON(L)
GND
INPUT SELECT 2
INPUT SELECT 1
SHARPNESS
SWD 5V
SLOW TRACKING
TRACKING
+5V
PRESET
SEG h
SEG f
SEG b
SEG a
SEG c
SEG g
SEG i
TIMER SW ON(L)
SWD 12V
POWER SW 1
POWER SW 2
T/V SW1
T/V SW2
To 31 POWER SW
S501 BT/AFC ON AFC
S503 SEARCH
S505 SET
S507
S502 SKIP
S504 STORE
S506
GND
BT/AFC
S201 INPUT SELECT
S221 C. MEMO
R202 SLOW TRACK
R203 TRACK
R201 10K P. SHARP
S220 TIMER SW
S108 SLOW
S109 SLOW
S106 PLAY
S105 PAUSE
S103 F.F
S104 REW
S101 STOP
S107 EJECT
S102 REC
S219 CLK ADJ
S218 P.N.O
S217 9
S216 8
S215 7
S214 6
S213 5
S212 4
S211 3
S210 2
S209 1
S208 0
S207 NEXT
S302 DOWN
S206 RESET
S205 BACK
S301 UP
S204 D.MODE
S203 CAN
S202 OTR
D411
D410
D408
CN1
CN2
CN3
CN4
CN5
CN7
CN8
CN9
J1
J2
J3
A
B
C
D
E
F
G
1
2
3
4
5
6

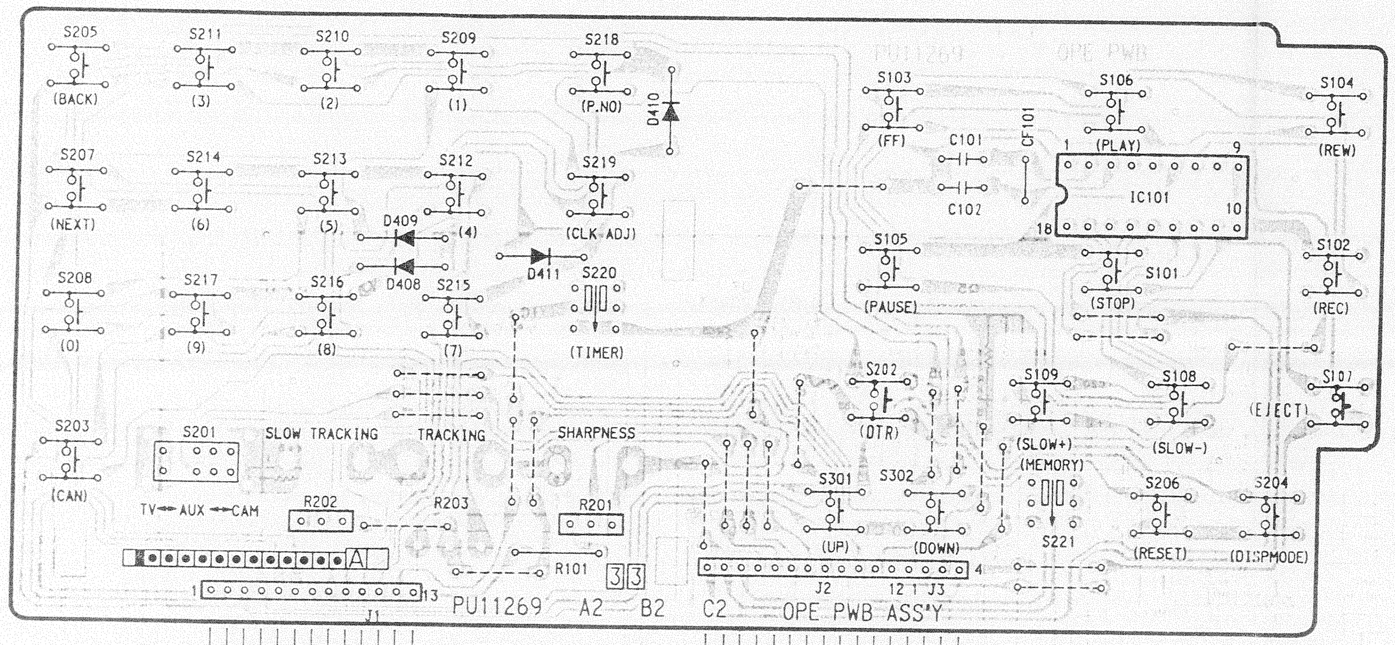
NOTES:
1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.
2. Voltages are DC-measured with a digital voltmeter during stop mode.



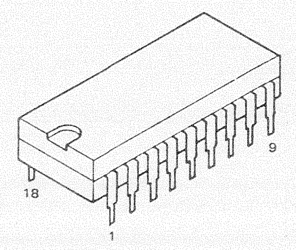
34 TIMER
32 DISPLAY
31 POWER SW PWB
From 01 POWER SUPPLY CN2
From 02 MAIN CN301
From 04 TUNER/IF CN1
From 02 MAIN CN103
To 31 POWER SW
IC402 TL066CP
IC401 UPD7519HG-023
IC301 MN1250BJA
Q401 2SD638RS
Q402 2SD636RS
X401 4.19 MHz
TP401
TP402
TP 404 0.5 SEC
FDP
CN1
CN2
CN3
CN4
CN6
CN7
CN8
CN9
J1
J2
J3
J301
AC 5V
AC 5V
-30V
UNSW12V
GND
TIMER SW ON(L)
OP1
OP2
DATA 0
DATA 1
DATA 2
DATA 3
DATA ENABLE
COUNT UP(L)DOWN
COUNT PULSE
BUSY
TUNER RESET
TU DATA ENABLE
EXPAND DATA 0
EXPAND DATA 1
EXPAND DATA 2
EXPAND DATA 3
INPUT SEL 1
INPUT SEL 2
SHARPNESS
SWD 5V
TRACKING
PRESET
SLOW TRACKING
SWD 12V
GND
BT/AFC
OP CODE
C MEMO
CAMERA ON(L)
INPUT SELECT 2
INPUT SELECT 1
+5V
SEG h
SEG f
SEG b
SEG a
SEG c
SEG g
SEG i
TIMER SW ON(L)
SWD 12V
POWER SW 1
POWER SW 2
T/V SW1
T/V SW2
STOP(G5)
TIME(G7)
START(G10)
TIME(G12)
MIX OPE
START(G11)
TIME(G9)
CLK
DATA
STOP(G6)
TIME(G4)
CLK(G13)
OTR(G8)
CH(G2)
SEG d
SEG e
CH(G3)
CH(G1)
D201-D206, D501, D502 MA161 x 8
D601
D407
RA401 220 x 4
RA402 100K x 4
RA403 220 x 4
C409 QAT3001-011
START
CLOCK
1ST
2nd
SUN
MON
TUE
WED
THU
FRI
SAT
REC STOP
LAP
AM
PM
COUNT
REPEAT
PROG
SET
CH
REC
D
E
F
G
I
J
K
L

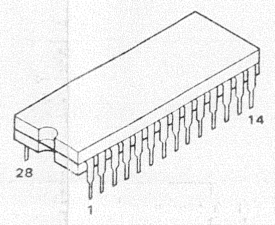
4.17 TIMER/DISPLAY/OPERATION/PRE-SETTER CIRCUIT BOARD

— OPERATION —

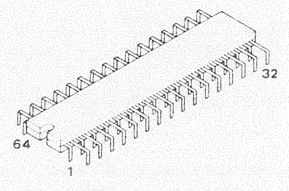


S205 (BACK)
S211 (3)
S210 (2)
S209 (1)
S218 (P.NO)
D410
S207 (NEXT)
S214 (6)
S213 (5)
S212 (4)
S219 (CLK ADJ)
D409
D408
D411
S208 (0)
S217 (9)
S216 (8)
S215 (7)
S220 (TIMER)
S203 (CAN)
S201
SLOW TRACKING
TRACKING
SHARPNESS
TV ← AUX → CAM
R202
R203
R201
R101
S103 (FF)
C101
C102
CF101
S106 (PLAY)
IC101
S104 (REW)
S105 (PAUSE)
S101 (STOP)
S102 (REC)
S202 (OTR)
S109 (SLOW+) (MEMORY)
S108 (SLOW-)
S107 (EJECT)
S301 (UP)
S302 (DOWN)
S221
S206 (RESET)
S204 (DISPMODE)
J1
J2
J3
33
PU11269 A2 B2 C2 OPE PWB ASS'Y

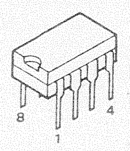




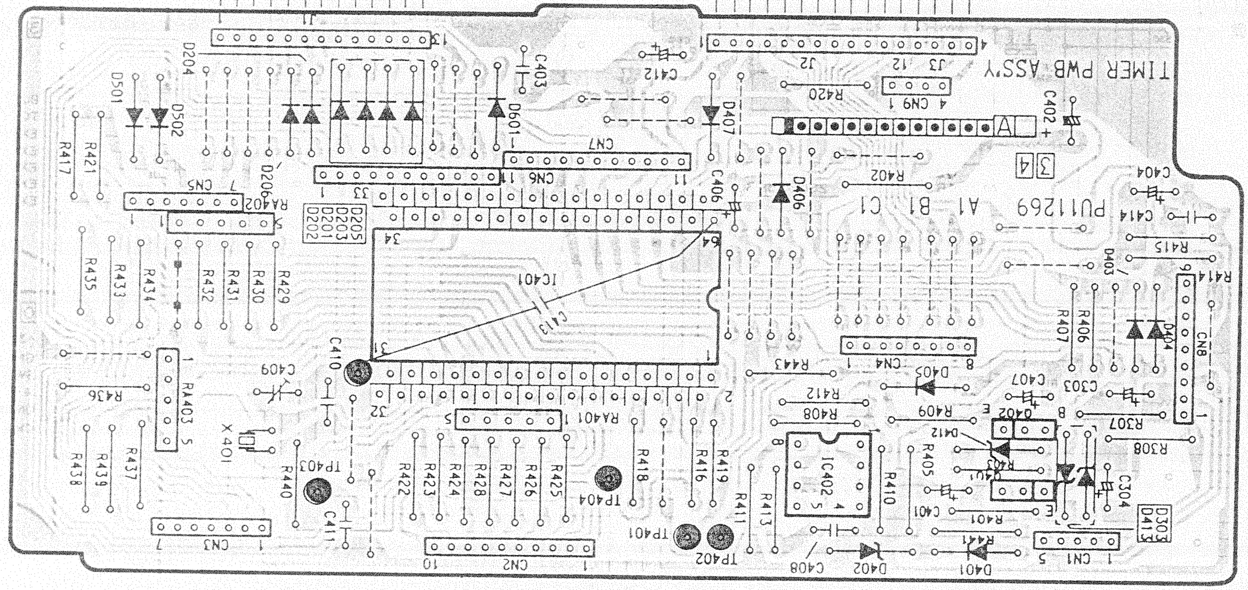
IC301
28
14
1



IC401
64
32
1

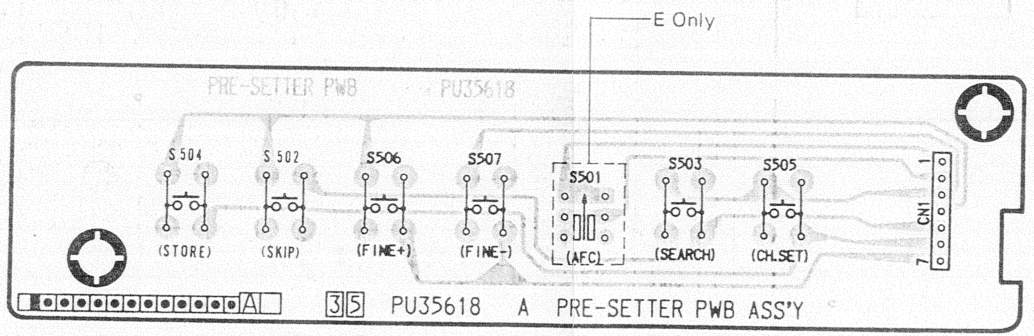


— TIMER —



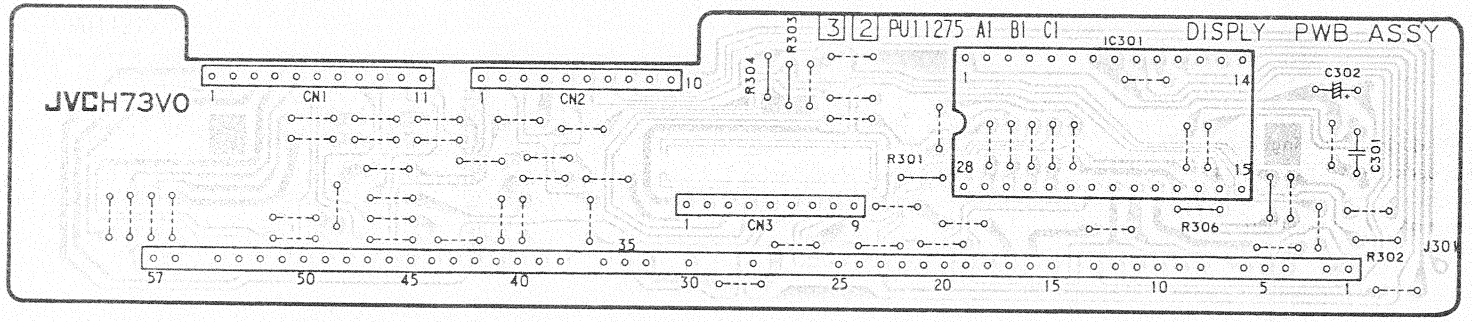
TIMER PWB ASS'Y
PU11269 A1 B1 C1
34
IC401
IC402
X401
D501
D502
D204
D205
D203
D201
D202
D601
D407
D406
D405
D404
D403
D402
D401
C403
C412
C402
C406
C404
C414
C409
C410
C411
C407
C303
C304
C401
C408
R417
R421
R435
R433
R434
R432
R431
R430
R429
R436
R438
R439
R437
R440
R422
R423
R424
R428
R427
R426
R425
R418
R416
R419
R411
R410
R405
R409
R408
R412
R443
R402
R420
R415
R414
R407
R406
R307
R308
R401
RA401
RA402
RA403
Q402
Q412
Q401
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
J1
J2
J3
TP401
TP402
TP403
TP404

— PRE-SETTER —



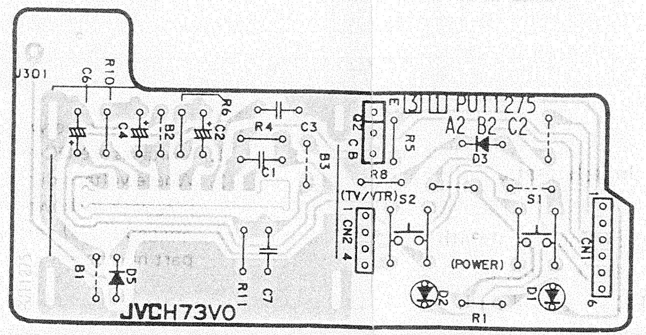
E Only
PRE-SETTER PWB PU35618
S504 (STORE)
S502 (SKIP)
S506 (FINE+)
S507 (FINE-)
S501 (AFC)
S503 (SEARCH)
S505 (CH.SET)
CN1
35
PU35618 A PRE-SETTER PWB ASS'Y

— DISPLY —



JVCH73V0
32
PU11275 A1 B1 C1
DISPLY PWB ASSY
IC301
C302
IC303
R304
R303
R301
R306
R302
CN1
CN2
CN3
J301
57
50
45
40
35
30
25
20
15
10
5
1

— POWER SW —

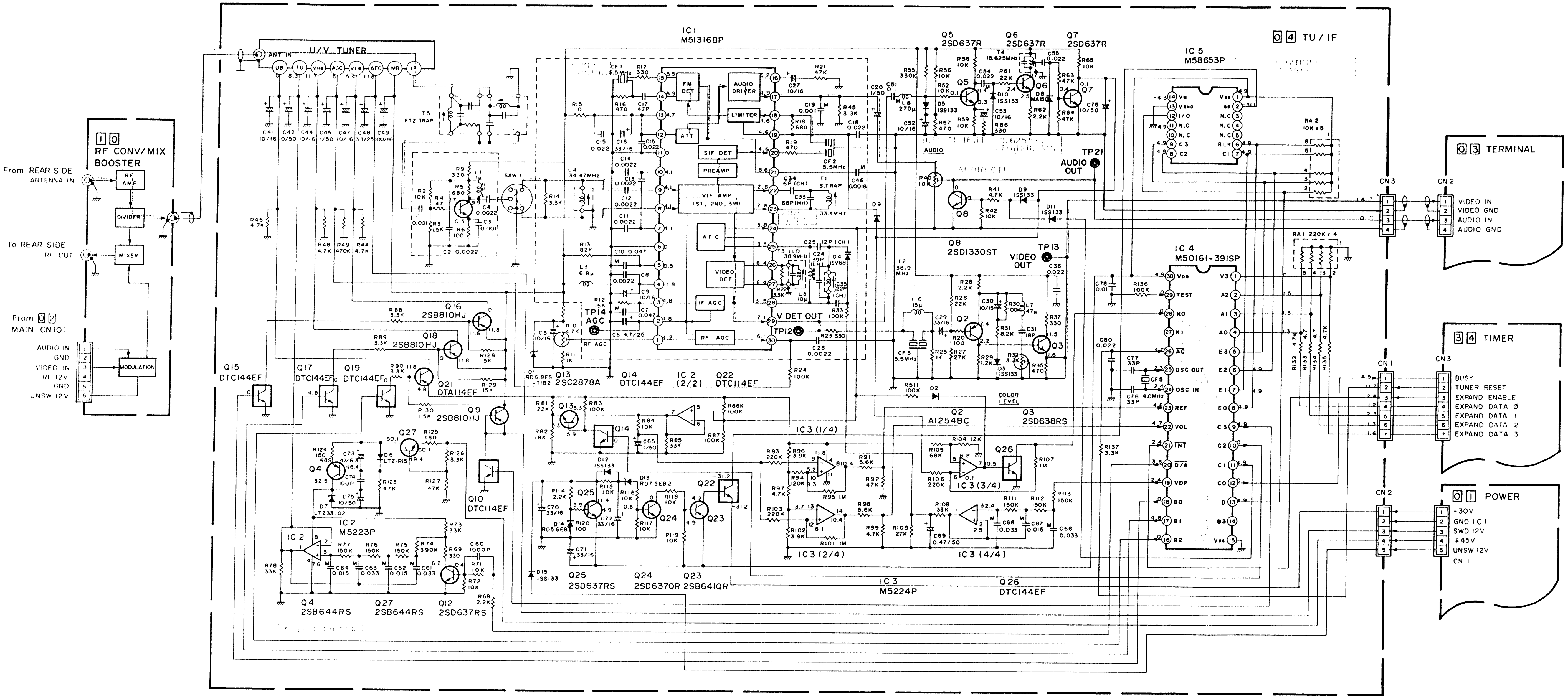


J301
PU11275 A2 B2 C2
31
C6
R10
C4
B2
C2
R9
R4
C3
C1
Q1
R5
B3
R8
D3
(TV/VTR) S2
S1
(POWER)
CN2
CN1
B1
D5
R11
C7
D2
D1
R1
JVCH73V0

A B C E F G H

6 5 4 3 2 1

4.18 TUNER/IF SCHEMATIC DIAGRAMS (HR-D250E/EG)


U/V TUNER
ANT IN
IC1 M51316BP
FM DET
AUDIO DRIVER
LIMITER
ATT
SIF DET
PREAMP
VIF AMP 1ST, 2ND, 3RD
AFC
VIDEO DET
IF AGC
RF AGC
TP14 AGC
V DET OUT
TP12
Q5 2SD637R
Q6 2SD637R
Q7 2SD637R
TP21 AUDIO OUT
Q8 2SD1330ST
TP13 VIDEO OUT
Q2 A1254BC
Q3 2SD638RS
COLOR LEVEL
IC5 M58653P
IC4 M50161-391SP
RA1 220K×4
RA2 10K×8
0 4 TU/IF
0 3 TERMINAL
VIDEO IN
VIDEO GND
AUDIO IN
AUDIO GND
3 4 TIMER
BUSY
TUNER RESET
EXPAND ENABLE
EXPAND DATA 0
EXPAND DATA 1
EXPAND DATA 2
EXPAND DATA 3
0 1 POWER
-30V
GND (C)
SWD 12V
+45V
UNSW 12V
CN1
CN2
CN3
1 0 RF CONV/MIX BOOSTER
From REAR SIDE ANTENNA IN
RF AMP
DIVIDER
MIXER
To REAR SIDE RF OUT
From 0 2 MAIN CN101
AUDIO IN
GND
VIDEO IN
RF 12V
GND
UNSW 12V
MODULATION
Q15 DTC144EF
Q16 2SB810HJ
Q17 DTC144EF
Q18 2SB810HJ
Q19 DTC144EF
Q21 DTA114EF
Q9 2SB810HJ
Q10 DTC114EF
Q13 2SC2878A
Q14 DTC144EF
IC2 (2/2)
Q22 DTC114EF
IC2 M5223P
Q4 2SB644RS
Q27 2SB644RS
Q12 2SD637RS
Q25 2SD637RS
Q24 2SD637QR
Q23 2SB641QR
IC3 (1/4)
IC3 (2/4)
IC3 (3/4)
IC3 (4/4)
IC3 M5224P
Q26 DTC144EF

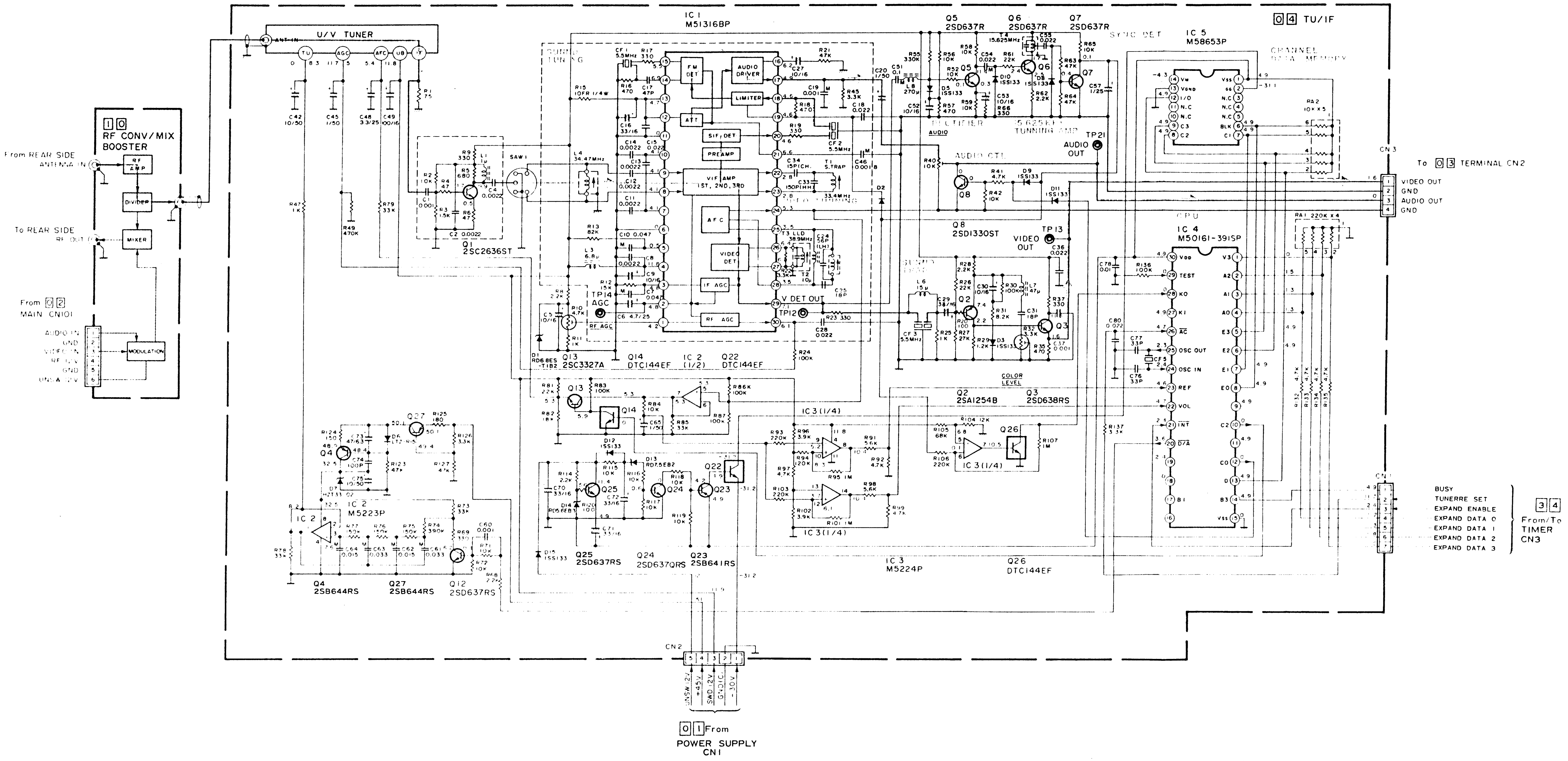
Signal flow in the schematic

Recording signal path
Playback signal path
REC/PB signal path

NOTE: Unless otherwise specified.

1. Voltages are DC-measured with a digital voltmeter during recording mode.
2. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
3. Shaded ( ) parts are critical for safety. Replace only with specified part numbers

4.19 TUNER/IF SCHEMATIC DIAGRAMS (HR-D250EK)



U/V TUNER
10 RF CONV/MIX BOOSTER
From REAR SIDE ANTENNA IN
To REAR SIDE RF OUT
RF AMP
DIVIDER
MIXER
MODULATION
From 02 MAIN CN101
AUDIO IN
GND
VIDEO IN
GND
IC 1 M51316BP
FM DET
AUDIO DRIVER
LIMITER
ATT
SIF/DET
PREAMP
VIF AMP 1ST, 2ND, 3RD
AFC
VIDEO DET
IF AGC
RF AGC
SAW1
Q1 2SC2636ST
TP14 AGC
V DET OUT
TP12
Q13 2SC3327A
Q14 DTC144EF
IC 2 (1/2)
Q22 DTC144EF
Q5 2SD637R
Q6 2SD637R
Q7 2SD637R
SYNC DET
AUDIO
TP21 AUDIO OUT
AUDIO CTL
Q8 2SD1330ST
TP13 VIDEO OUT
Q2 2SA1254B
Q3 2SD638RS
COLOR LEVEL
IC 5 M58653P
CHANNEL DATA MEMORY
04 TU/IF
CN3
To 03 TERMINAL CN2
VIDEO OUT
GND
AUDIO OUT
GND
CPU
IC 4 M50161-391SP
BUSY
TUNERRE SET
EXPAND ENABLE
EXPAND DATA 0
EXPAND DATA 1
EXPAND DATA 2
EXPAND DATA 3
34 From/To TIMER CN3
IC 3 (1/4)
IC 3 M5224P
Q26 DTC144EF
IC 2 M5223P
Q4 2SB644RS
Q27 2SB644RS
Q12 2SD637RS
Q25 2SD637RS
Q24 2SD637QRS
Q23 2SB641RS
CN2
UNSW 12V
+45V
SWD 12V
D/A2V
-30V
01 From POWER SUPPLY CN1

Signal flow in the schematic

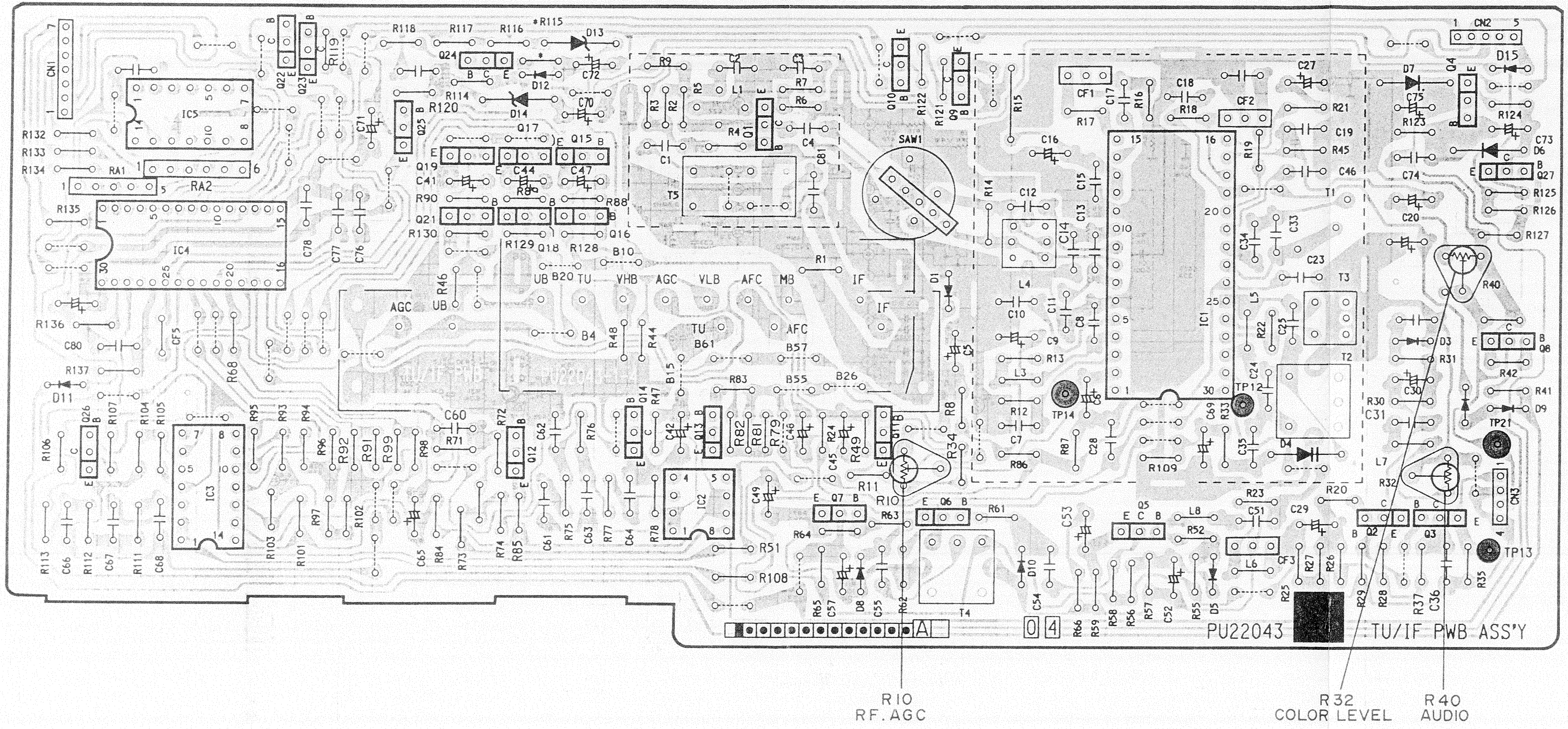
Recording signal path
Playback signal path
REC/PB signal path

NOTE: Unless otherwise specified.

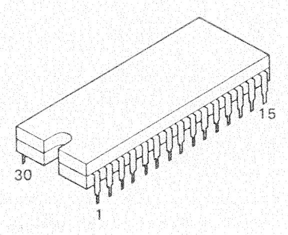
1. Voltages are DC-measured with a digital voltmeter during recording mode.
2. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
3. Shaded ( ) parts are critical for safety. Replace only with specified part numbers

4.20 TUNER/IF CIRCUIT BOARDS

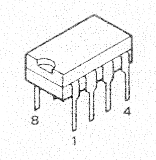
– TUNER/IF – (HR-D250E/EG)


CN1
CN2
CN3
IC1
IC2
IC3
IC4
IC5
RA1
RA2
SAW1
T1
T2
T3
T4
T5
CF1
CF2
CF3
CF5
TP12
TP13
TP14
TP21
UB
B20
TU
VHB
AGC
VLB
AFC
MB
IF
B4
B10
B15
B26
B55
B57
B61
PU22043
TU/IF PWB ASS'Y
R10
RF.AGC
R32
COLOR LEVEL
R40
AUDIO

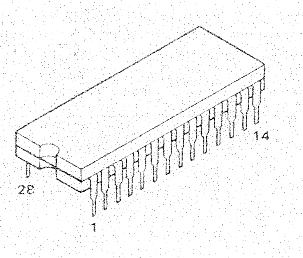
IC1, 4



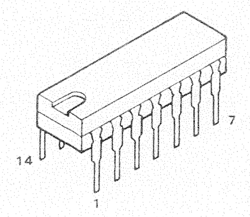
IC2



IC3

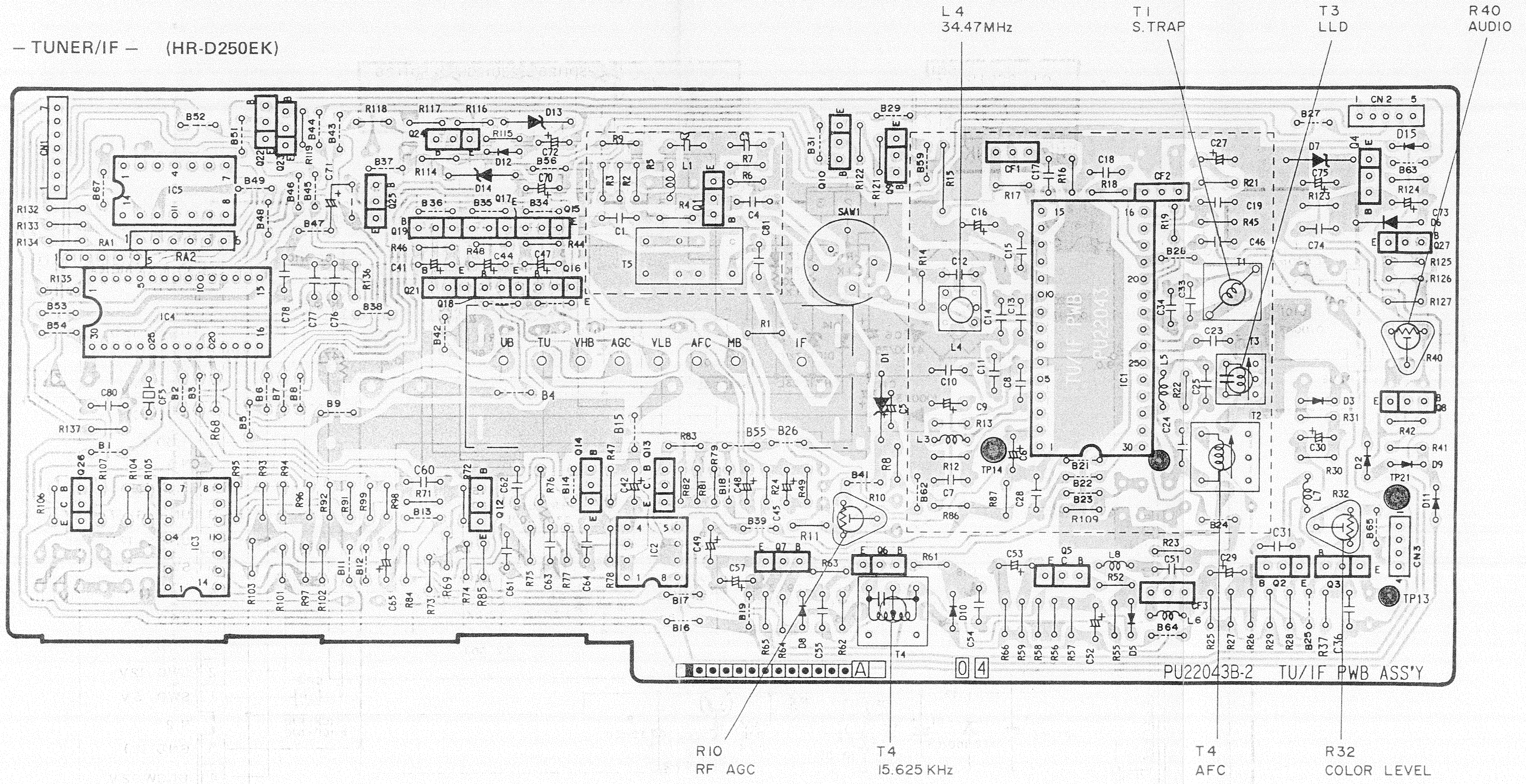


IC5

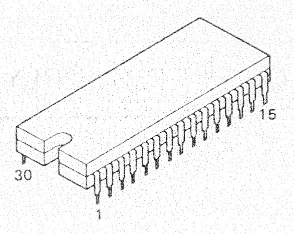


4.21 TUNER/IF CIRCUIT BOARD

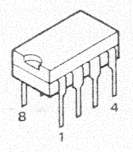
— TUNER/IF — (HR-D250EK)


L 4
34.47MHz
T 1
S.TRAP
T 3
LLD
R 40
AUDIO
UB
TU
VHB
AGC
VLB
AFC
MB
IF
TU/IF PWB PU22043
PU22043B-2 TU/IF PWB ASS'Y
R10
RF AGC
T 4
15.625 KHz
T 4
AFC
R 32
COLOR LEVEL

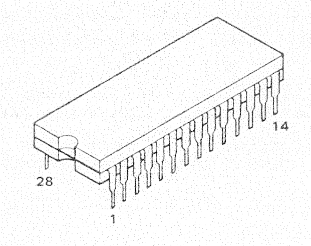
IC1, 4



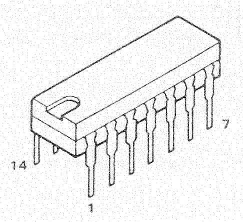
IC2



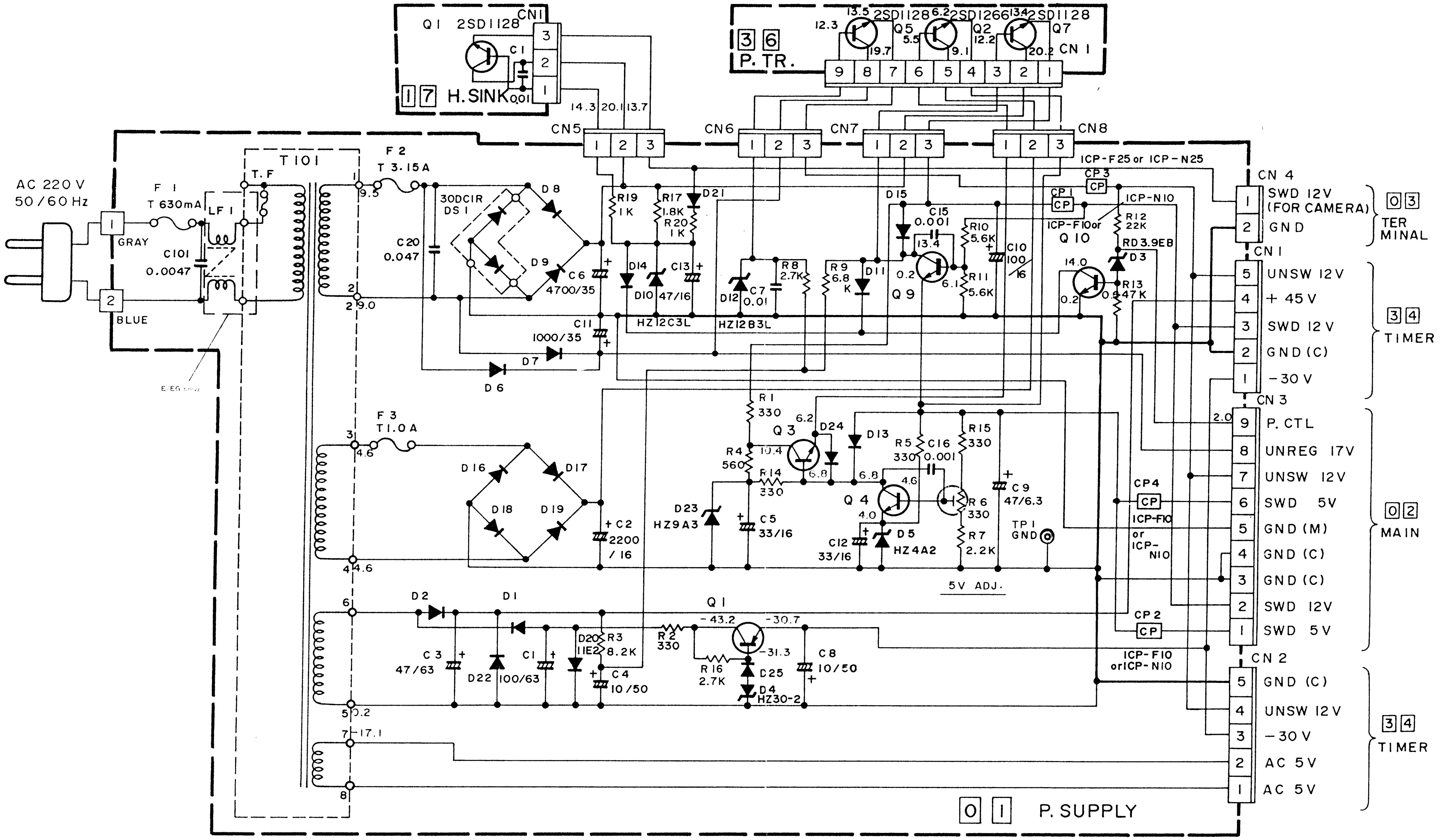
IC3



IC5



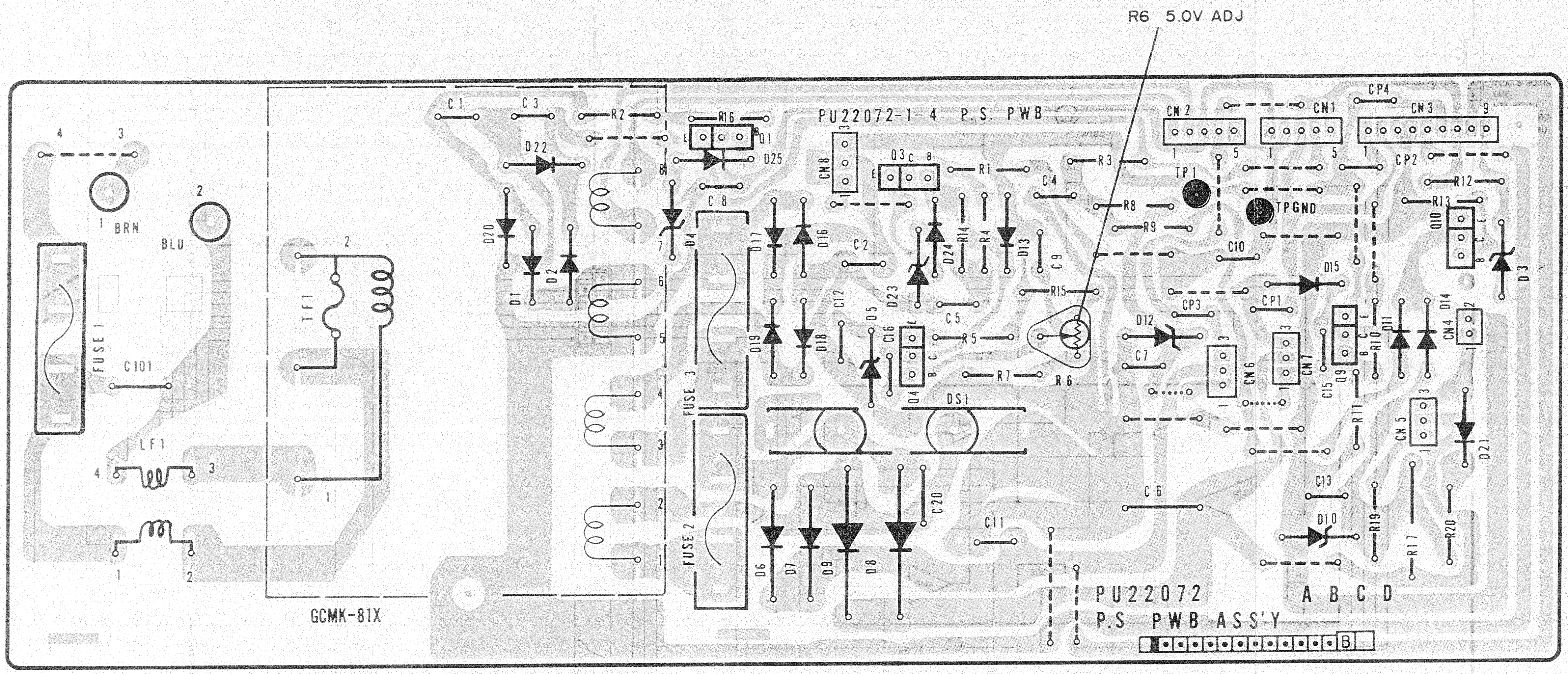
4.22 POWER SUPPLY SCHEMATIC DIAGRAM


Q1 2SD1128
C1
0.01
CN1
3
2
1
17 H.SINK
14.3 20.1 13.7
36
P. TR.
2SD1128 Q5
2SD1266 Q2
2SD1128 Q7
13.5
12.3
19.7
6.2
5.5
9.1
13.4
12.2
20.2
CN 1
9 8 7 6 5 4 3 2 1
CN5 1 2 3
CN6 1 2 3
CN7 1 2 3
CN8 1 2 3
AC 220 V
50/60 Hz
GRAY
BLUE
F 1
T 630mA
LF 1
C101
0.0047
T101
T.F
F 2
T 3.15A
9.5
29.0
C20
0.047
30DC1R
DS 1
D8
D9
C6
4700/35
C11
1000/35
D7
D6
R19
1K
R17
1.8K
R20
1K
D21
D14
D10
C13
47/16
HZ12C3L
D12
C7
0.01
R8
2.7K
HZ12B3L
R9
6.8K
D11
D15
C15
0.001
Q9
0.2
6.1
R10
5.6K
R11
5.6K
C10
100/16
ICP-F25 or ICP-N25
CP3
CP
CP1
ICP-N10
ICP-F10or
Q10
R12
22K
RD3.9EB
D3
14.0
0.2
0.8
R13
47K
F 3
T1.0A
4.6
44.6
D16
D17
D18
D19
C2
2200/16
R1
330
R4
560
Q3
6.2
10.4
D24
6.8
D13
R14
330
D23
HZ9A3
C5
33/16
R5
330
C16
0.001
R15
330
Q4
4.6
4.0
6.8
C12
33/16
D5
HZ4A2
R6
330
R7
2.2K
C9
47/6.3
TP1
GND
5V ADJ.
CP4
CP
ICP-F10
or
ICP-N10
CP2
CP
ICP-F10
orICP-N10
D2
D1
C3
47/63
D22
C1
100/63
D20
11E2
R3
8.2K
C4
10/50
R2
330
Q1
-43.2
-30.7
-31.3
R16
2.7K
D25
D4
HZ30-2
C8
10/50
50.2
7 17.1
8
CN 4
1 SWD 12V (FOR CAMERA)
2 GND
03 TER MINAL
CN 1
5 UNSW 12V
4 +45V
3 SWD 12V
2 GND (C)
1 -30V
34 TIMER
CN 3
2.0
9 P. CTL
8 UNREG 17V
7 UNSW 12V
6 SWD 5V
5 GND (M)
4 GND (C)
3 GND (C)
2 SWD 12V
1 SWD 5V
02 MAIN
CN 2
5 GND (C)
4 UNSW 12V
3 -30V
2 AC 5V
1 AC 5V
34 TIMER
01 P. SUPPLY

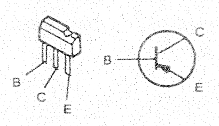
NOTES:

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.
2. Voltages are DC-measured with a digital voltmeter during stop mode.

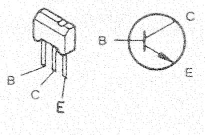
4.23 POWER SUPPLY CIRCUIT BOARD


R6 5.0V ADJ
PU22072-1-4 P.S. PWB
FUSE 1
BRN
BLU
C101
LF1
TF1
GCMK-81X
C1
C3
R2
R16
Q1
D22
D25
CN8
Q3
R1
R3
C4
CN 2
CN1
CN3
CP4
CP2
TP1
TPGND
R8
R9
R12
R13
Q10
D3
D20
D1
D2
D4
C8
D17
D16
C2
D24
R14
R4
D13
C9
C10
D15
R15
C12
D23
D5
C16
Q4
C5
R5
R7
R6
D12
CP3
CP1
CN4
D14
D11
R10
Q9
C15
CN7
CN6
C7
D19
D18
FUSE 3
DS1
R11
CN5
D21
C20
C6
C13
C11
D10
R19
R17
R20
FUSE 2
D6
D7
D9
D8
PU22072
P.S PWB ASS'Y
A B C D
B

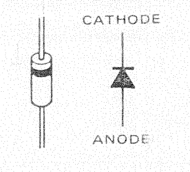
Q 1



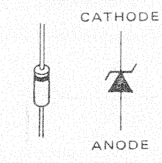
Q3, 4, 9, 10



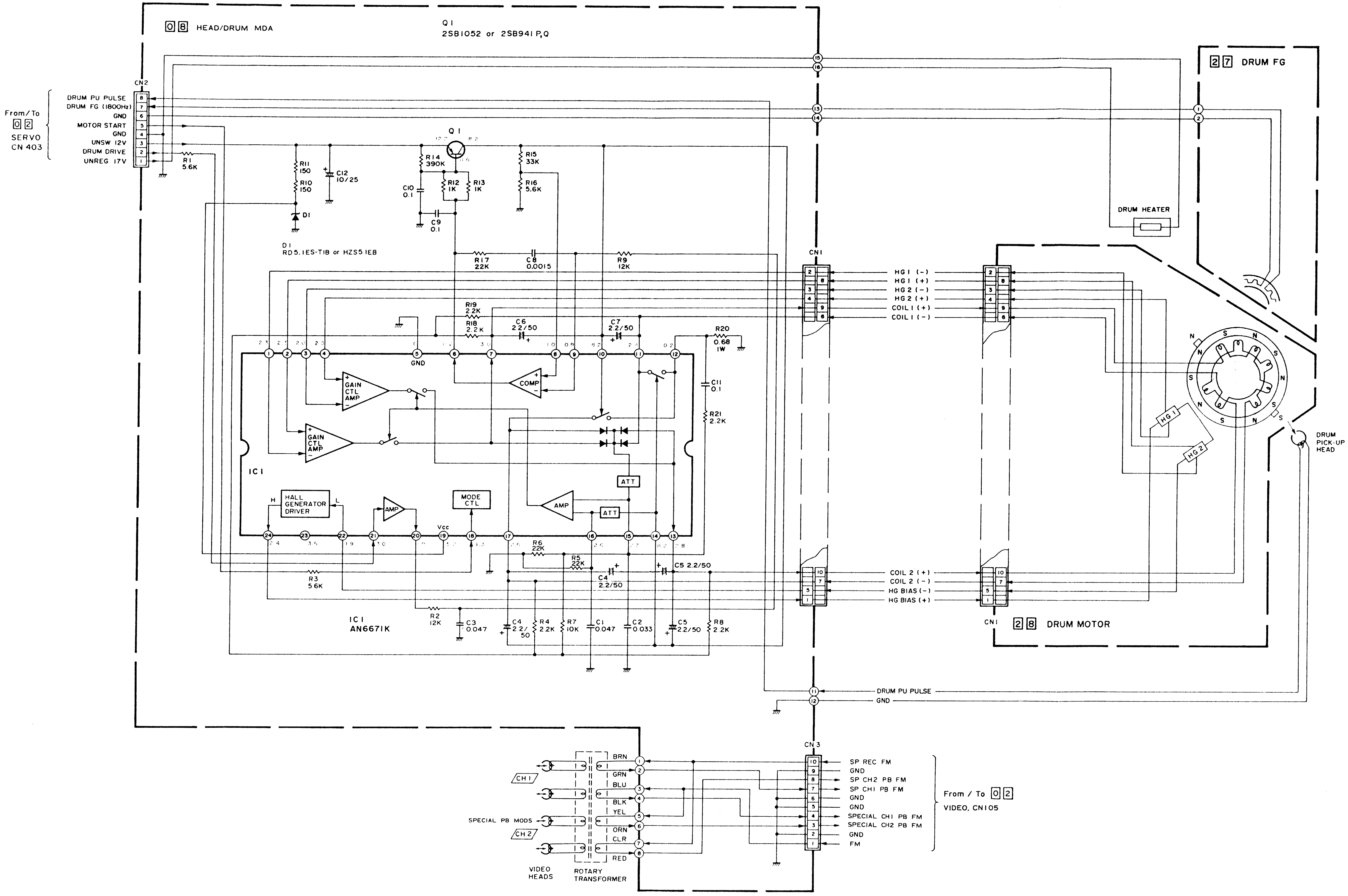
D1, 2,
D6 ~ 9, 11
D13 ~ 22, 24, 25


CATHODE
ANODE

D3, 4, 5, 10
D12, 23,

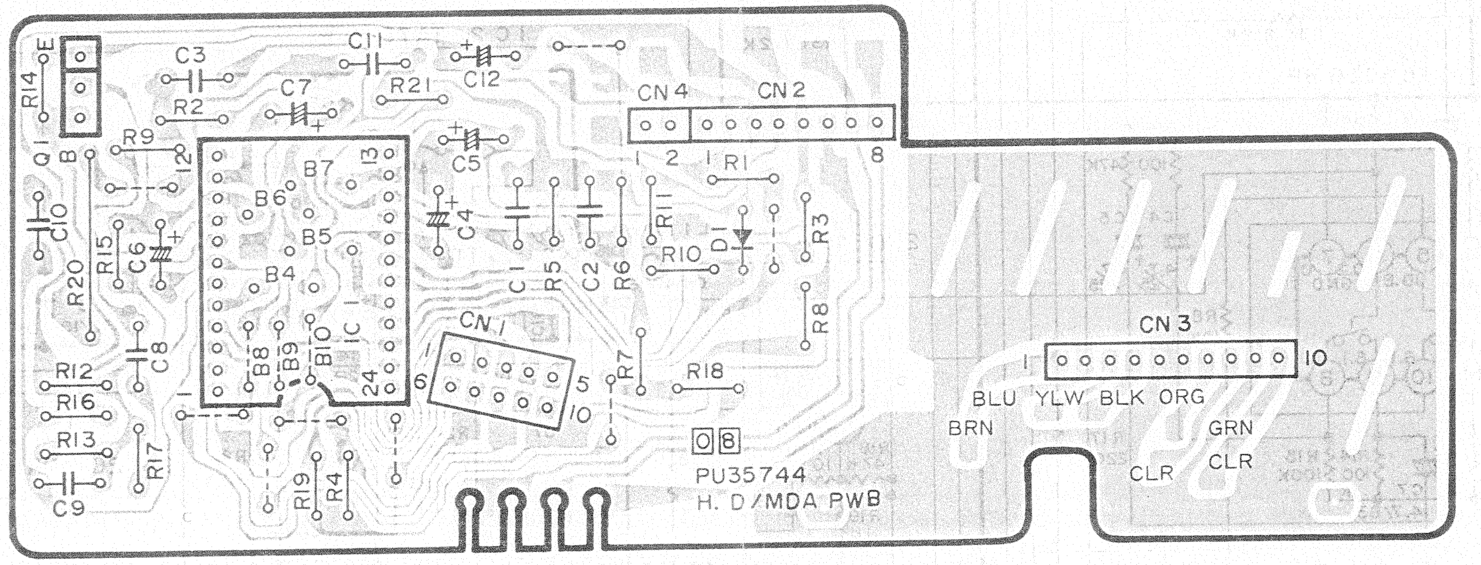

CATHODE
ANODE

4.24 HEAD/DRUM MDA, DRUM FG & DRUM MOTOR SCHEMATIC DIAGRAMS

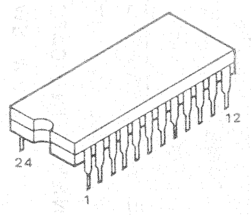

08 HEAD/DRUM MDA
Q1
2SB1052 or 2SB941 P,Q
CN2
From/To
02
SERVO
CN 403
DRUM PU PULSE
DRUM FG (1800Hz)
GND
MOTOR START
GND
UNSW 12V
DRUM DRIVE
UNREG 17V
R1
5.6K
R11
150
R10
150
C12
10/25
D1
D1
RD5.1ES-T1B or HZS5.1E8
R14
390K
R12
1K
R13
1K
C10
0.1
C9
0.1
R15
33K
R16
5.6K
R17
22K
C8
0.0015
R9
12K
R19
2.2K
R18
2.2K
C6
2.2/50
C7
2.2/50
R20
0.68
1W
C11
0.1
R21
2.2K
GND
GAIN CTL AMP
COMP
ATT
AMP
HALL GENERATOR DRIVER
H
L
MODE CTL
Vcc
IC1
IC1
AN6671K
R6
22K
R5
22K
C4
2.2/50
C5 2.2/50
R3
5.6K
R2
12K
C3
0.047
C4
2.2/50
R4
2.2K
R7
10K
C1
0.047
C2
0.033
C5
2.2/50
R8
2.2K
CN1
HG1 (-)
HG1 (+)
HG2 (-)
HG2 (+)
COIL 1 (+)
COIL 1 (-)
COIL 2 (+)
COIL 2 (-)
HG BIAS (-)
HG BIAS (+)
CN1
28 DRUM MOTOR
27 DRUM FG
DRUM HEATER
HG1
HG2
N
S
DRUM PICK-UP HEAD
DRUM PU PULSE
GND
CN3
SP REC FM
GND
SP CH2 PB FM
SP CH1 PB FM
GND
GND
SPECIAL CH1 PB FM
SPECIAL CH2 PB FM
GND
FM
From / To 02
VIDEO, CN105
BRN
GRN
BLU
BLK
YEL
ORN
CLR
RED
CH1
CH2
SPECIAL PB MODS
VIDEO HEADS
ROTARY TRANSFORMER

NOTE: Shaded ( ) parts are critical for safety.
Replace only with specified part numbers.

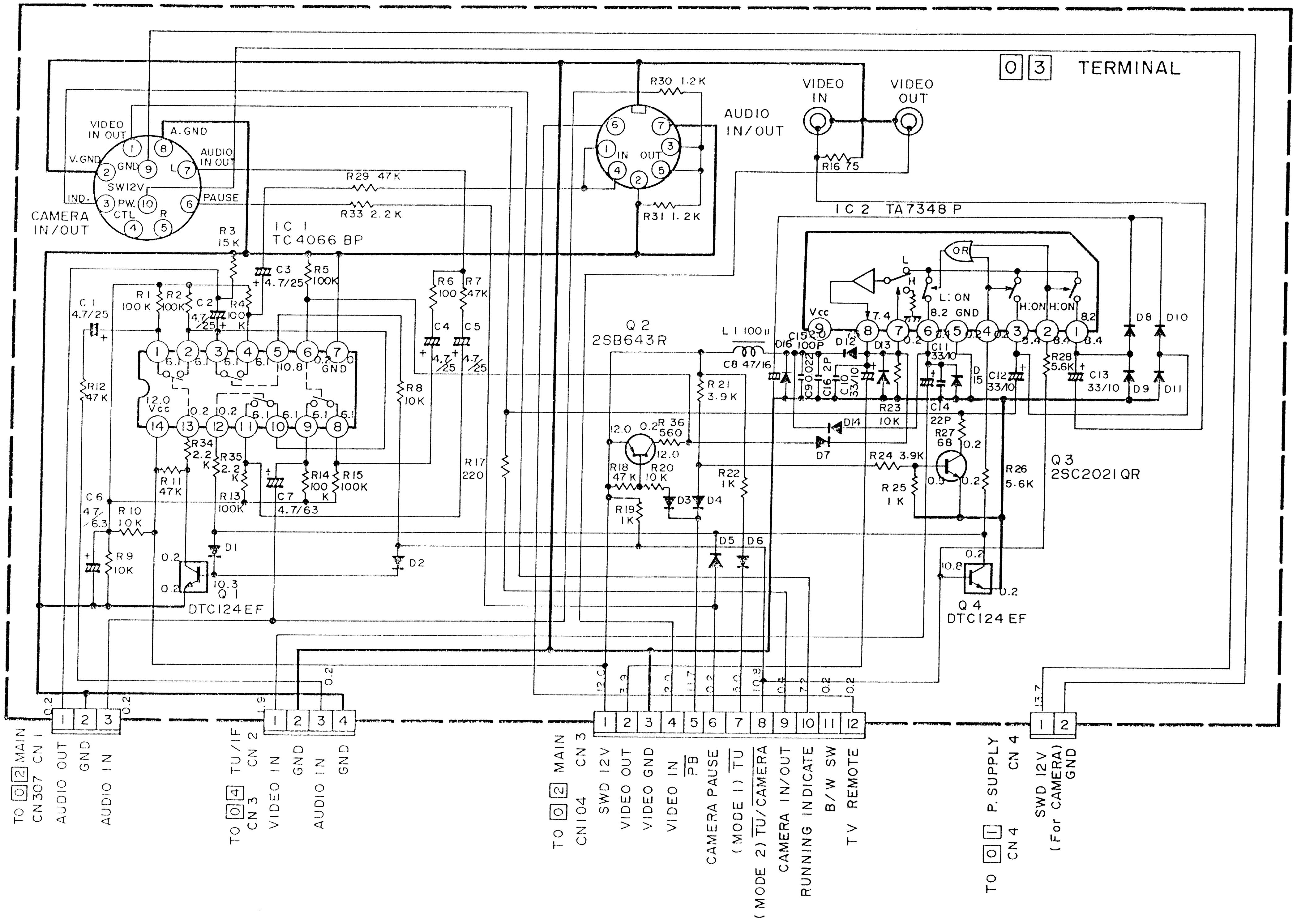
4.25 HEAD/DRUM MDA CIRCUIT BOARD


R14
E
Q1
B
C3
R2
C11
C7
R21
C12
R9
12
13
B7
B6
B5
B4
C5
C4
C10
R15
C6
R20
C8
R12
R16
R13
C9
R17
B8
B9
B10
IC1
24
1
R19
R4
CN1
6
5
1
10
C1
R5
C2
R6
CN4
CN2
1
2
1
8
R1
R11
R10
D1
R3
R8
R7
R18
PU35744
H. D/MDA PWB
CN3
1
10
BLU
YLW
BLK
ORG
BRN
GRN
CLR
CLR

IC1



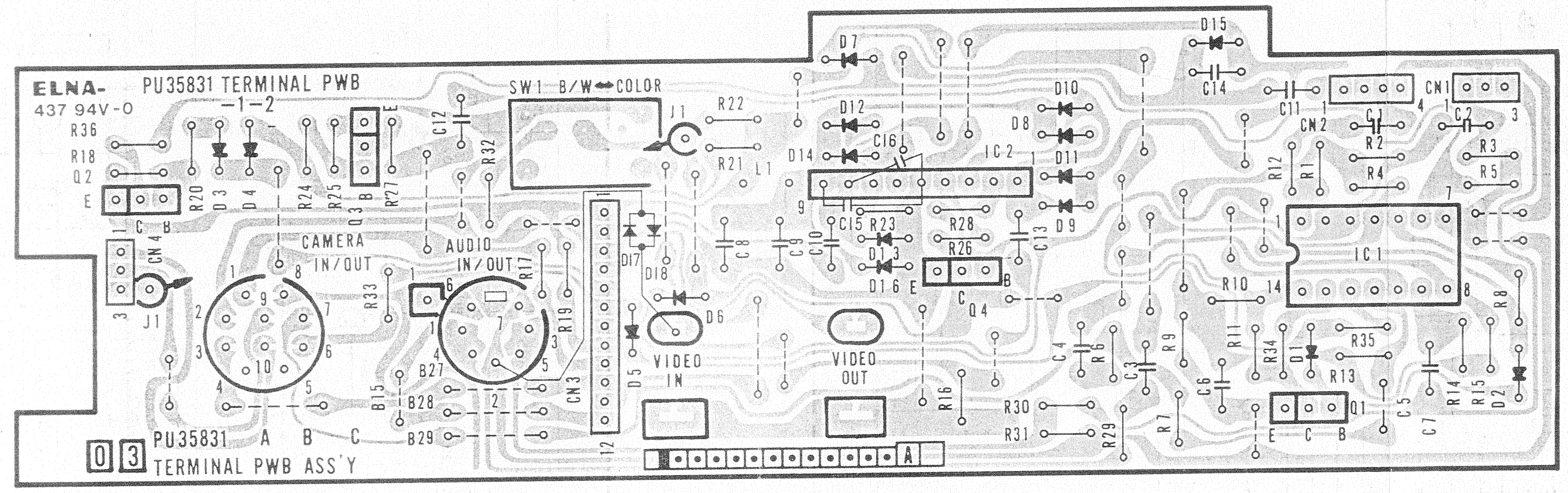
4.26 TERMINAL SCHEMATIC DIAGRAM


03 TERMINAL
CAMERA IN/OUT
VIDEO IN OUT
V.GND
IND.
A.GND
AUDIO IN OUT
PAUSE
SW12V
PW. CTL
L
R
GND
AUDIO IN/OUT
IN
OUT
VIDEO IN
VIDEO OUT
R30 1.2K
R31 1.2K
R16 75
R29 47K
R33 2.2K
R3 15K
IC 1 TC4066 BP
C3 4.7/25
R5 100K
R6 100
R7 47K
C1 4.7/25
R1 100K
R2 100K
C2 4.7/25
R4 100K
C4 4.7/25
C5 4.7/25
R12 47K
Vcc
R8 10K
R34 2.2K
R35 2.2K
R11 47K
R13 100K
C7 4.7/63
R14 100K
R15 100K
R17 220
C6 4.7/6.3
R10 10K
R9 10K
D1
D2
Q1 DTC124EF
Q2 2SB643R
L1 100μ
C8 47/16
R21 3.9K
R36 560
R18 47K
R20 10K
R19 1K
D3
D4
R22 1K
D5
D6
IC 2 TA7348P
OR
L
H
L: ON
H:ON
8.2 GND
D16
C15 100P
C10 33/10
C16 2P
D12
D13
D14
D7
C11 33/10
D15
C12 33/10
R28 5.6K
C13 33/10
R23 10K
C14 22P
R27 68
R24 3.9K
R25 1K
R26 5.6K
Q3 2SC2021QR
Q4 DTC124EF
D8
D9
D10
D11
TO 02 MAIN CN307 CN1
AUDIO OUT
GND
AUDIO IN
TO 04 TU/IF CN3 CN2
VIDEO IN
GND
AUDIO IN
GND
TO 02 MAIN CN104 CN3
SWD 12V
VIDEO OUT
VIDEO GND
VIDEO IN PB
CAMERA PAUSE
(MODE 1) TU
(MODE 2) TU/CAMERA
CAMERA IN/OUT
RUNNING INDICATE
B/W SW
TV REMOTE
TO 01 P. SUPPLY CN4 CN4
SWD 12V (For CAMERA)
GND

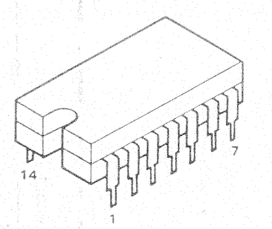
NOTES:

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.
2. Voltages are DC-measured with a digital voltmeter during stop mode.

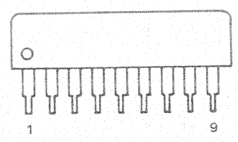
4.27 TERMINAL CIRCUIT BOARD


ELNA-
437 94V-0
PU35831 TERMINAL PWB
-1-2
SW1 B/W↔COLOR
J1
R22
R21
L1
R36
R18
Q2
E C B
R20
D3
D4
R24
R25
Q3
R27
R32
C12
CN4
J1
CAMERA
IN/OUT
AUDIO
IN/OUT
R33
R17
R19
B27
B15
B28
B29
CN3
D5
D17
D18
D6
VIDEO
IN
VIDEO
OUT
C8
C9
C10
D7
D12
D14
C16
IC2
D10
D8
D11
D9
C15
R23
D13
D16
R28
R26
C13
Q4
R16
R30
R31
R29
C4
R6
C3
R9
R7
C6
D15
C14
C11
CN2
C1
R2
R4
R12
R1
CN1
C2
R3
R5
IC1
R10
R11
R34
D1
R35
R13
Q1
C5
C7
R14
R15
D2
R8
12
A
PU35831 A B C
03 TERMINAL PWB ASS'Y

IC1

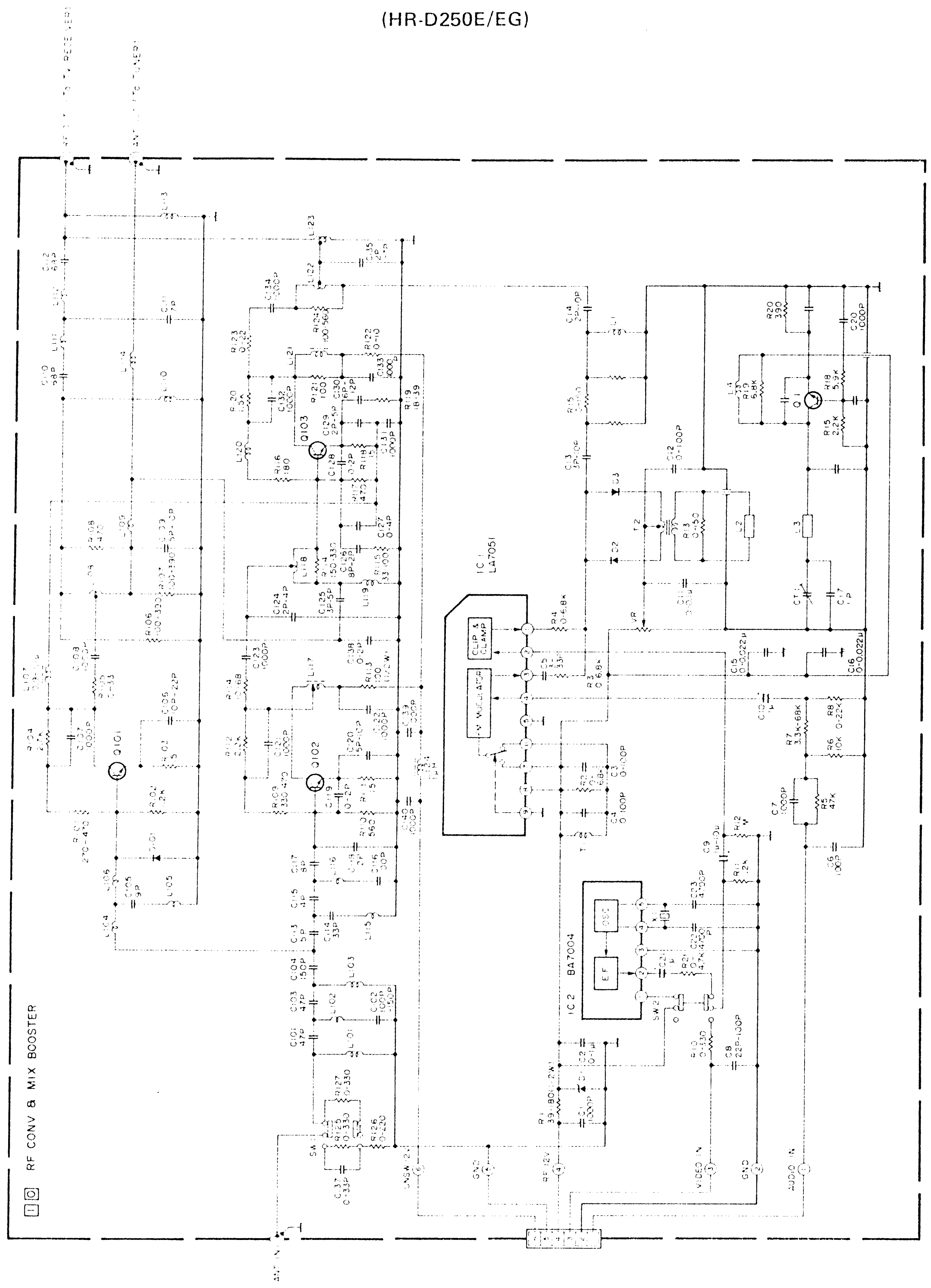


IC2

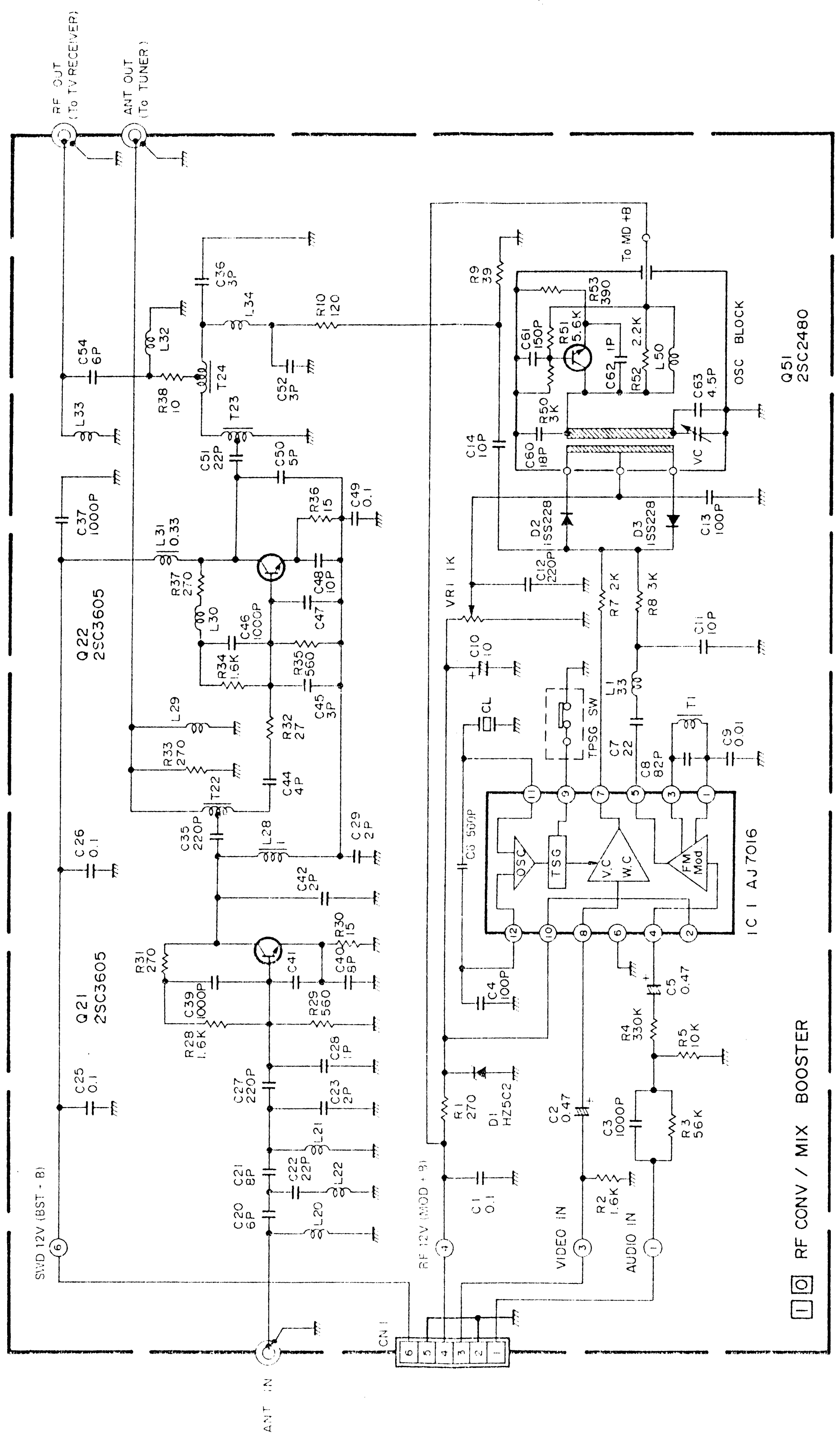


4.28 RF CONVERTER/MIX BOOSTOR SCHEMATIC DIAGRAM

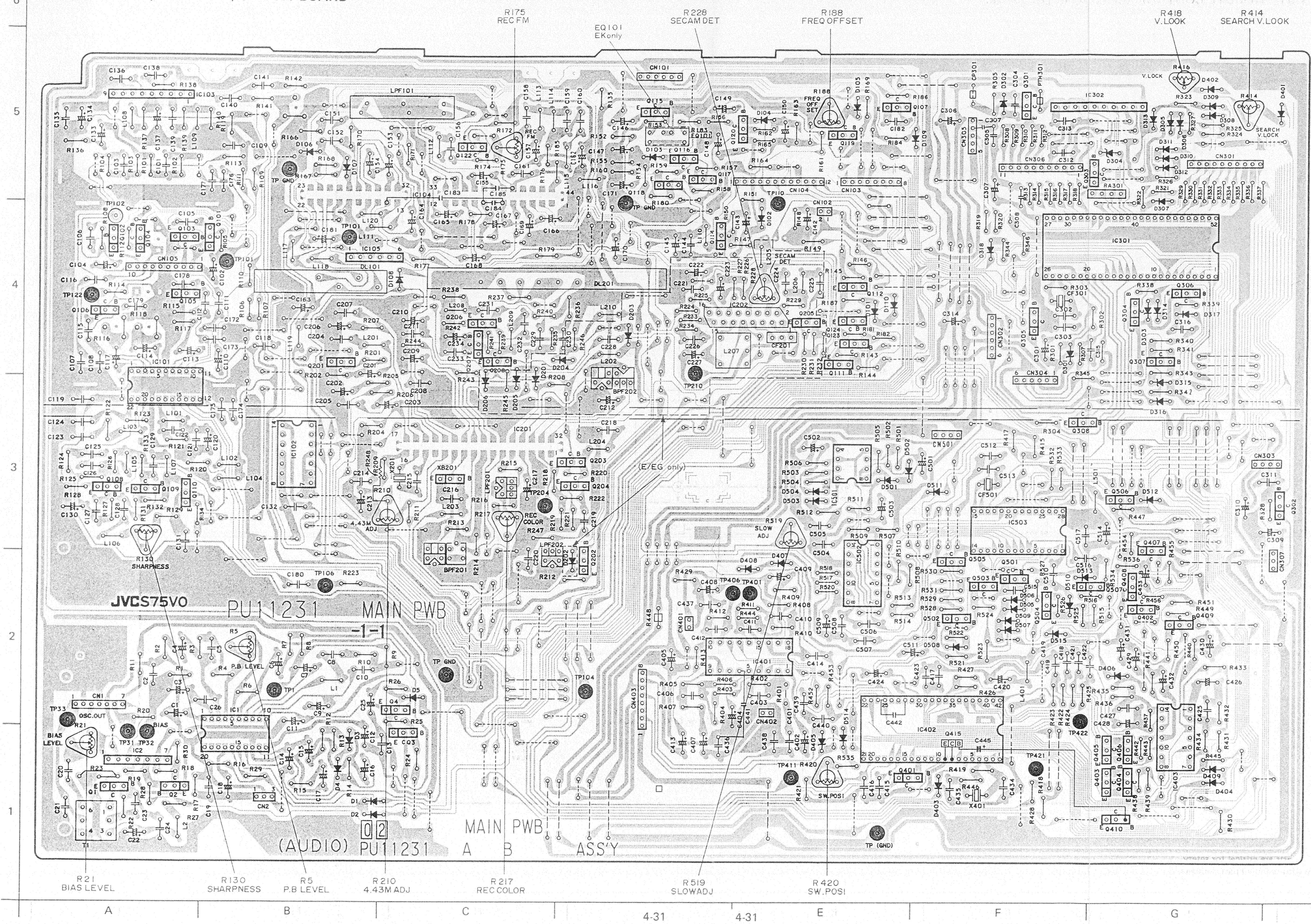
(HR-D250E/EG)


RF OUT (TO TV RECEIVER)
ANT OUT (TO TUNER)
Q101
Q102
Q103
Q1
IC1 LA7051
CLIP & CLAMP
FM MODULATOR
IC2 BA7004
OSC
E.F
SW2
SW1
RF 12V
VIDEO IN
GND
AUDIO IN
ANT IN
RF CONV & MIX BOOSTER

(HR-D250EK)


RF OUT (To TV RECEIVER)
ANT OUT (To TUNER)
C54 6P
L32
L33
R38 10
T24
C36 3P
L34
C52 3P
R10 120
T23
C51 22P
C50 5P
C37 1000P
L31 0.33
R36 15
C49 0.1
R37 270
C48 10P
L30
C46 1000P
C47
Q22 2SC3605
R34 1.6K
R35 560
C45 3P
L29
R32 27
R33 270
T22
C44 4P
C35 220P
L28
C29 2P
C26 0.1
C42 2P
R31 270
R30 15
C40 6P
C41
C39 1000P
R29 560
Q21 2SC3605
R28 1.6K
C28 1P
C25 0.1
C27 220P
C23 2P
C21 8P
C22 22P
L21
L22
C20 6P
L20
SWD 12V (BST - B)
ANT IN
R9 39
To MD +B
R53 390
C61 150P
R51 5.6K
C62 1P
R52 2.2K
L50
C63 4.5P
OSC BLOCK
Q51 2SC2480
R50 3K
C60 18P
C14 10P
VC
D2 1SS228
D3 1SS228
C13 100P
VR1 1K
C12 220P
R7 2K
R8 3K
C11 10P
C10 10
L1 33
CL
TPSG SW
C7 22
C8 82P
T1
C9 0.01
C6 500P
OSC
TSG
V.C
W.C
FM Mod
IC1 AJ7016
C4 100P
C5 0.47
R4 330K
R5 10K
R1 270
D1 HZ5C2
C2 0.47
C3 1000P
R3 56K
C1 0.1
R2 1.6K
RF 12V (MOD + B)
VIDEO IN
AUDIO IN
CN1
RF CONV / MIX BOOSTER

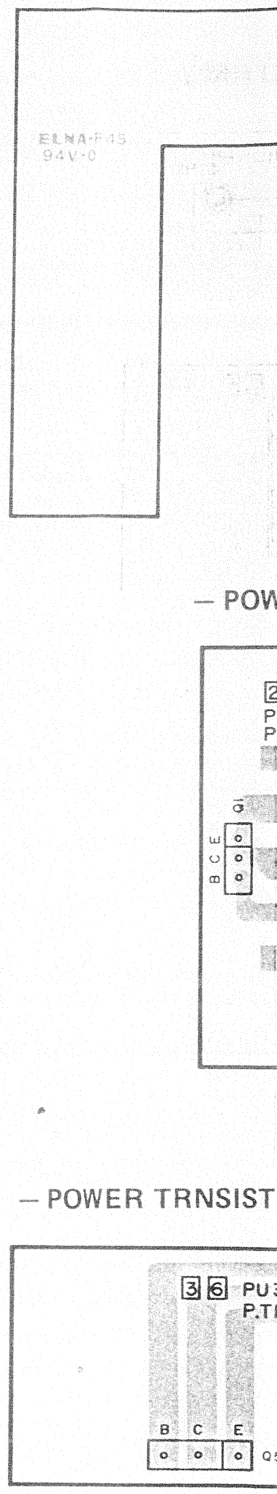
4.29 MAIN (MECHACON) CIRCUIT BOARD

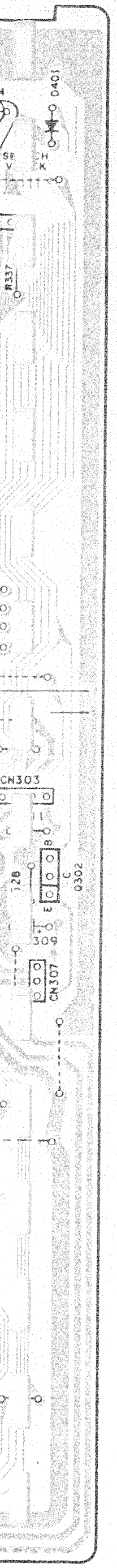

6
5
4
3
2
1
R175
REC FM
EQ101
EKonly
R228
SECAM DET
R188
FREQ OFFSET
R418
V.LOOK
R414
SEARCH V.LOOK
(E/EG only)
JVCS75VO
PU11231 MAIN PWB
-1-1
02
(AUDIO) PU11231 MAIN PWB A B ASS'Y
R21
BIAS LEVEL
R130
SHARPNESS
R5
P.B LEVEL
R210
4.43M ADJ
R217
REC COLOR
R519
SLOW ADJ
R420
SW.POSI
A
B
C
E
F
G
H

– HEAT SINK –

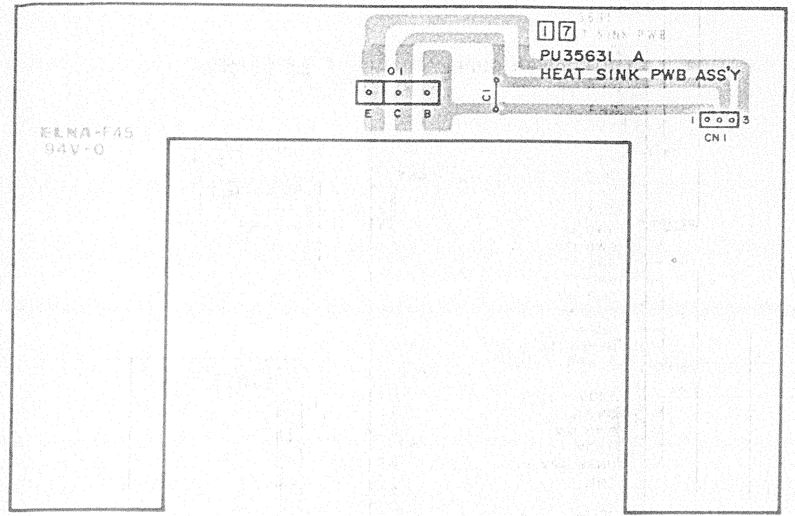
– POW

– POWER TRNSIST

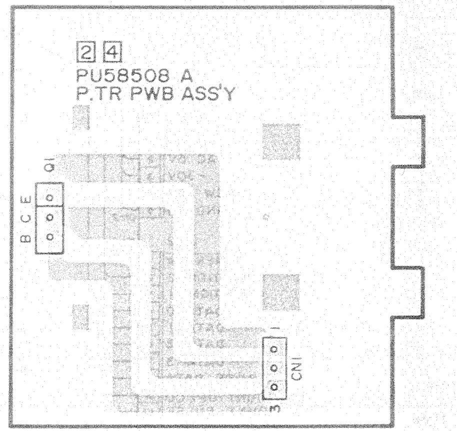



D401
CN303
Q302
309
CN307
R337

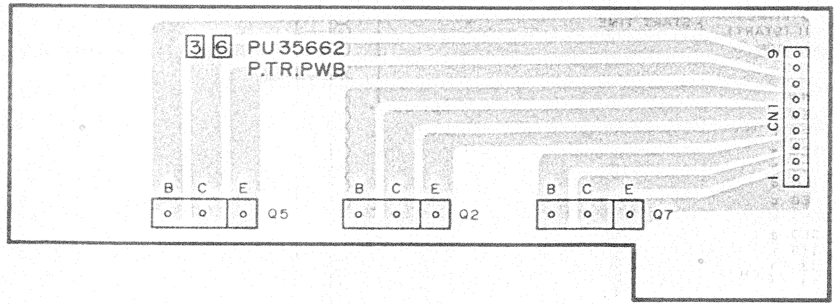
– HEAT SINK –


17
PU35631 A
HEAT SINK PWB ASS'Y
Q1
E C B
C1
1 CN1 3
ELNA-F45
94V-0

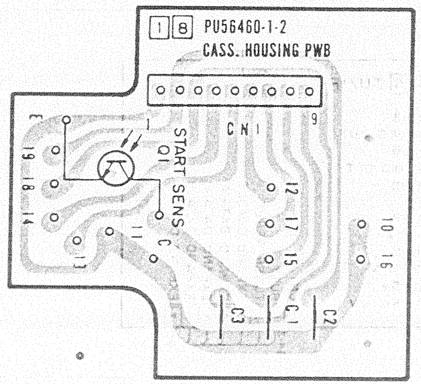
– POWER TRNSISTOR –


24
PU58508 A
P.TR PWB ASS'Y
Q1
B C E
1
CN1
3

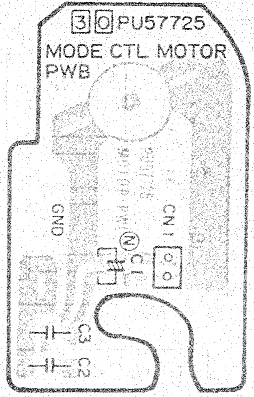
– POWER TRNSISTOR –


36 PU35662
P.TR.PWB
9
CN1
1
B C E Q5
B C E Q2
B C E Q7

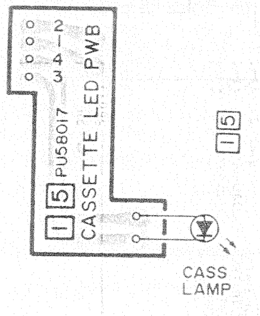
– CASSETTE HOUSING –


18 PU56460-1-2
CASS. HOUSING PWB
CN1
1
9
START SENS
Q1
19 18 14 13
12 11 10 16 15
C1 C2 C3

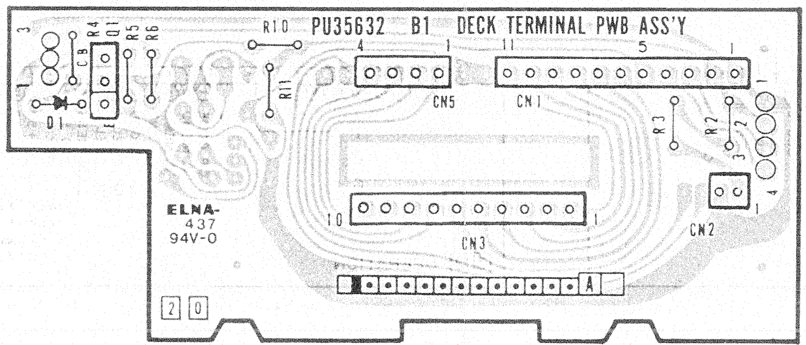
– MODE CTL MOTOR –


30 PU57725
MODE CTL MOTOR
PWB
GND
CN1
C1
C3
C2

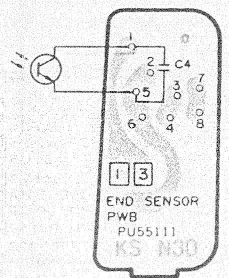
– CASSETTE LED –


1
2
3
4
15 PU58017
CASSETTE LED PWB
CASS
LAMP
15

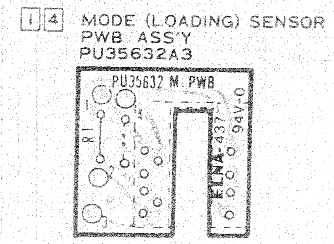
– DECK TERMINAL –


PU35632 B1 DECK TERMINAL PWB ASS'Y
R10
R4 R5 R6
C9
Q1
D1
R11
4 1
CN5
5 1
CN1
R3
R2
10 1
CN3
CN2
ELNA-437
94V-0
A
20

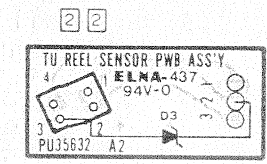
– END SENSOR –


C4
1 2 3 4 5 6 7 8
13
END SENSOR
PWB
PU55111
KS N30

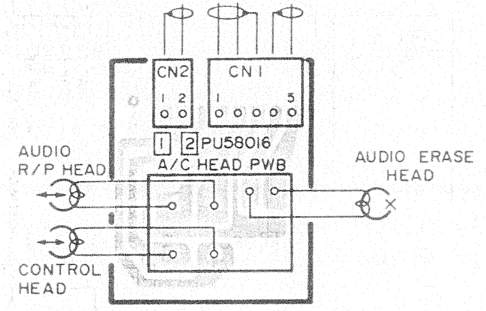
– MODE SENSOR –


14 MODE (LOADING) SENSOR
PWB ASS'Y
PU35632A3
PU35632 M PWB
R1
ELNA-437
94V-0

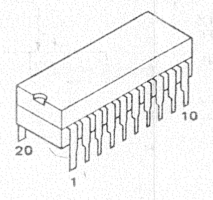
– TAKE UP REEL SENSOR –


22
TU REEL SENSOR PWB ASS'Y
ELNA-437
94V-0
D3
1 2 3 4
PU35632 A2

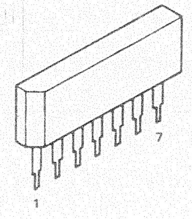
– A/C HEAD –


9 29 9
CN2
1 2
CN1
1 5
12 PU58016
A/C HEAD PWB
AUDIO
R/P HEAD
AUDIO ERASE
HEAD
CONTROL
HEAD

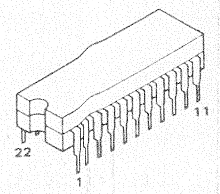
IC1



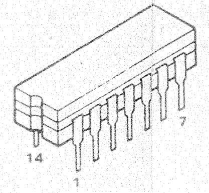
IC2



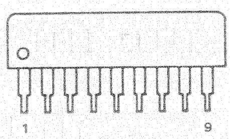
IC101



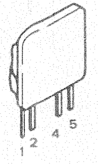
IC102



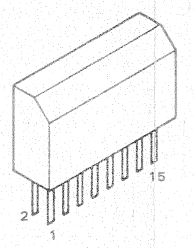
IC103



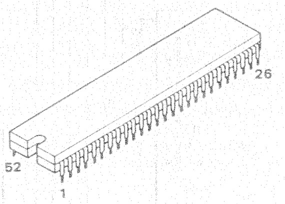
IC105



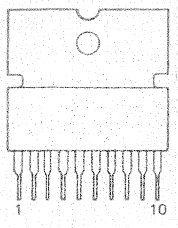
IC202



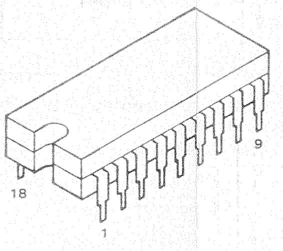
IC301



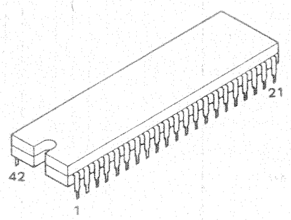
IC302



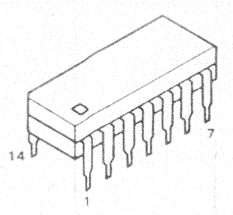
IC401



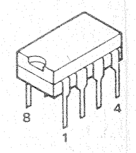
IC402



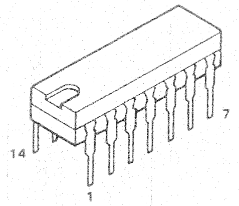
IC403



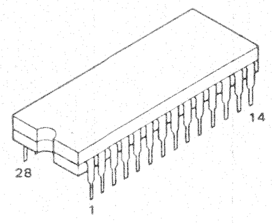
IC501



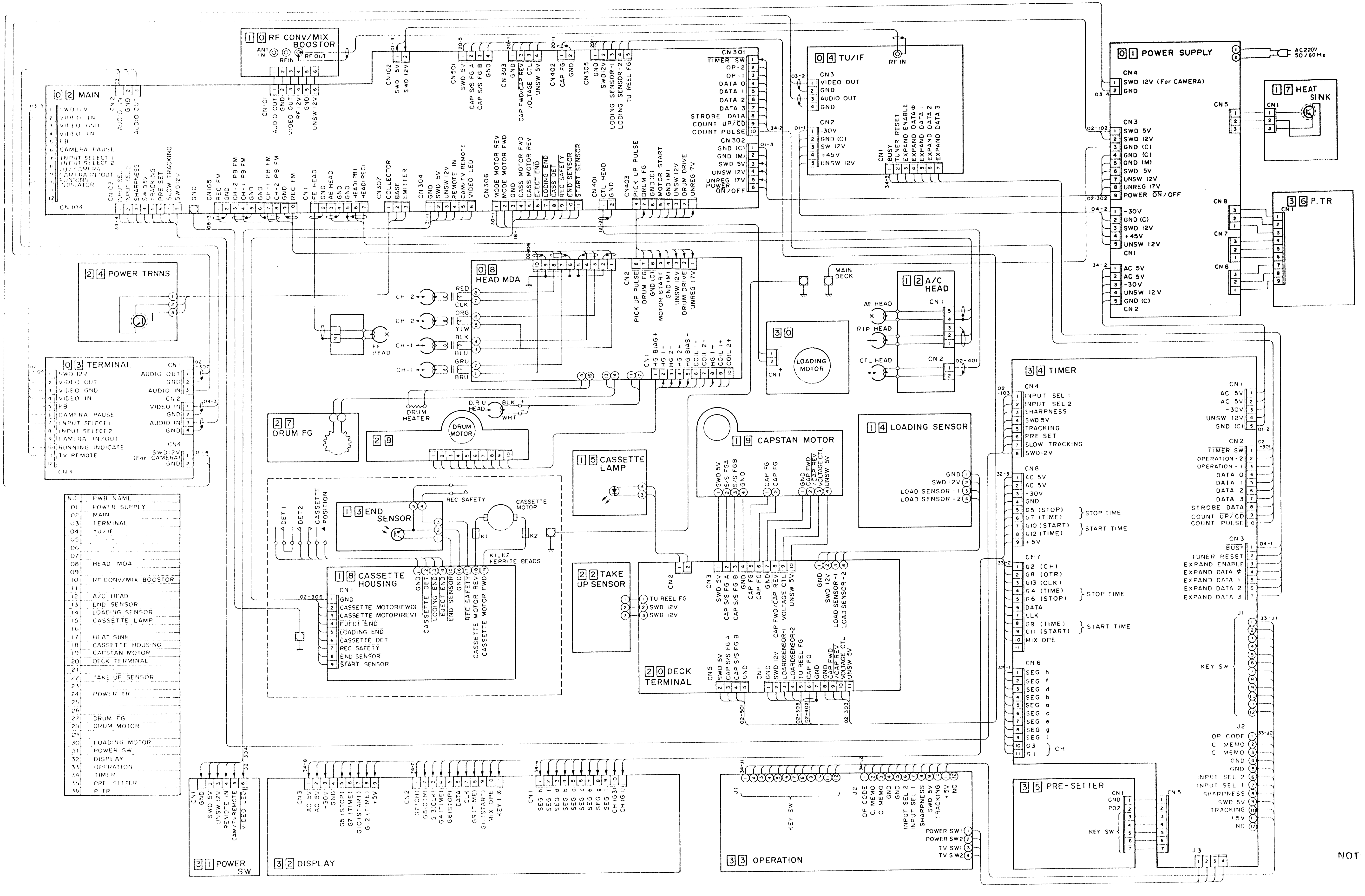
IC502



IC503



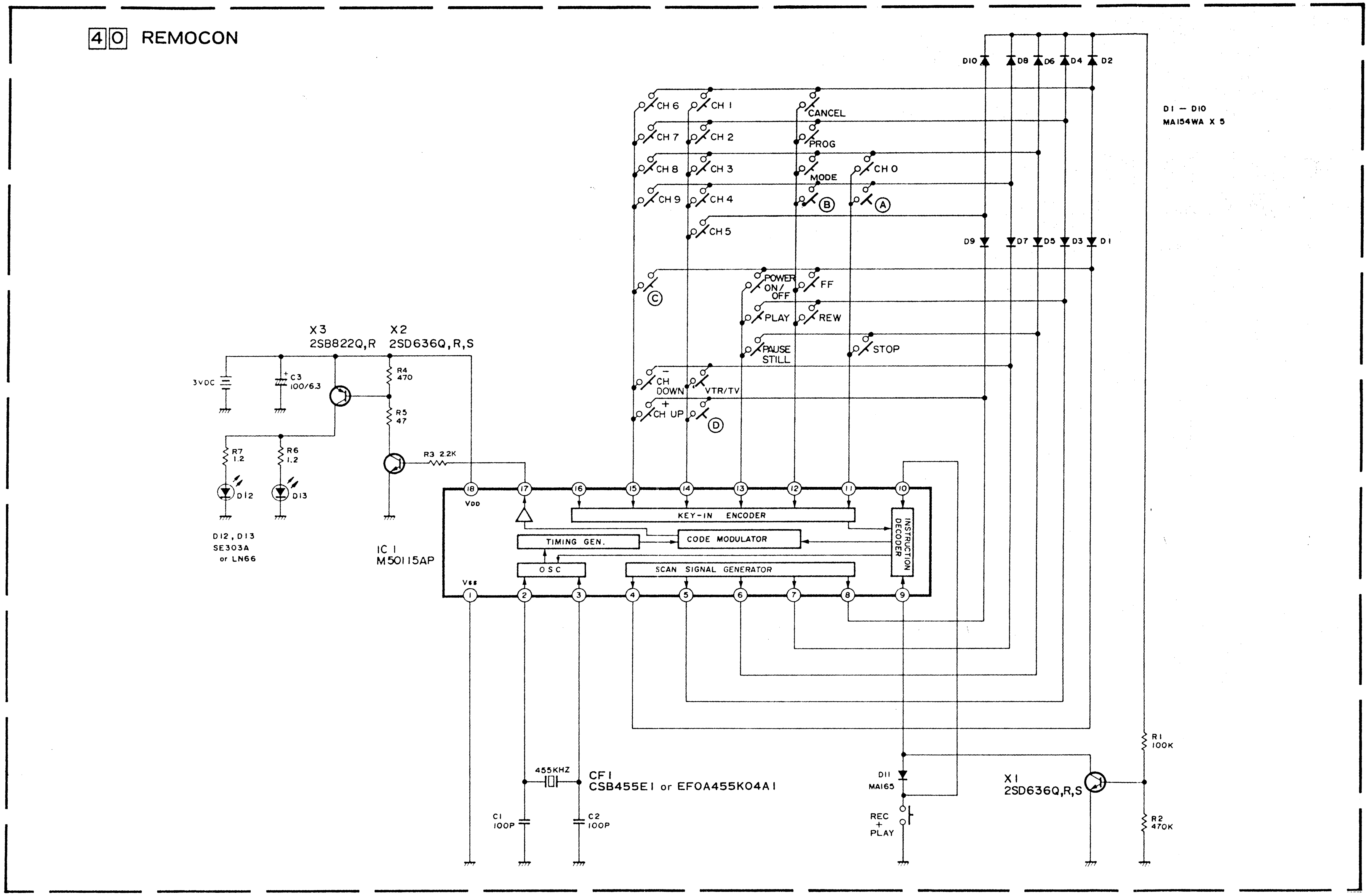
4.30 OVERALL WIRING


0 2 MAIN
1 0 RF CONV/MIX BOOSTOR
0 4 TU/IF
0 1 POWER SUPPLY
AC220V 50/60Hz
1 7 HEAT SINK
3 6 P.TR
2 4 POWER TRNNS
0 3 TERMINAL
0 8 HEAD MDA
1 2 A/C HEAD
3 0 LOADING MOTOR
2 7 DRUM FG
2 8 DRUM MOTOR
1 5 CASSETTE LAMP
1 9 CAPSTAN MOTOR
1 4 LOADING SENSOR
3 4 TIMER
1 3 END SENSOR
1 8 CASSETTE HOUSING
2 2 TAKE UP SENSOR
2 0 DECK TERMINAL
3 1 POWER SW
3 2 DISPLAY
3 3 OPERATION
3 5 PRE-SETTER
MAIN DECK
REC SAFETY
CASSETTE MOTOR
K1, K2 FERRITE BEADS
FE HEAD
AE HEAD
R/P HEAD
CTL HEAD
DRUM HEATER
DRUM HEAD
KEY SW
STOP TIME
START TIME
CH

NO	PWB NAME
01	POWER SUPPLY
02	MAIN
03	TERMINAL
04	TU/IF
05	
06	
07	
08	HEAD MDA
09	
10	RF CONV/MIX BOOSTOR
11	
12	A/C HEAD
13	END SENSOR
14	LOADING SENSOR
15	CASSETTE LAMP
16	
17	HEAT SINK
18	CASSETTE HOUSING
19	CAPSTAN MOTOR
20	DECK TERMINAL
21	
22	TAKE UP SENSOR
23	
24	POWER TR
25	
26	
27	DRUM FG
28	DRUM MOTOR
29	
30	LOADING MOTOR
31	POWER SW
32	DISPLAY
33	OPERATION
34	TIMER
35	PRE-SETTER
36	P TR

NOT

4.31 REMOTE CONTROL SCHEMATIC DIAGRAM


40 REMOCON
D10
D8
D6
D4
D2
D9
D7
D5
D3
D1
D1 — D10
MA154WA X 5
CH 6
CH 1
CANCEL
CH 7
CH 2
PROG
CH 8
CH 3
MODE
CH 0
CH 9
CH 4
B
A
CH 5
C
POWER ON/OFF
FF
PLAY
REW
PAUSE STILL
STOP
– CH DOWN
VTR/TV
+ CH UP
D
X3
2SB822Q,R
X2
2SD636Q,R,S
3VDC
C3
100/6.3
R4
470
R5
47
R7
1.2
R6
1.2
R3 2.2K
D12
D13
D12, D13
SE303A
or LN66
IC 1
M50115AP
VDD
VSS
18
17
16
15
14
13
12
11
10
1
2
3
4
5
6
7
8
9
KEY-IN ENCODER
CODE MODULATOR
TIMING GEN.
OSC
SCAN SIGNAL GENERATOR
INSTRUCTION DECODER
455KHZ
CF1
CSB455E1 or EF0A455K04A1
C1
100P
C2
100P
D11
MA165
REC + PLAY
X1
2SD636Q,R,S
R1
100K
R2
470K

E: Shaded ( ) parts are critical for safety.
Replace only with specified part numbers.

SECTION 5
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION
Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

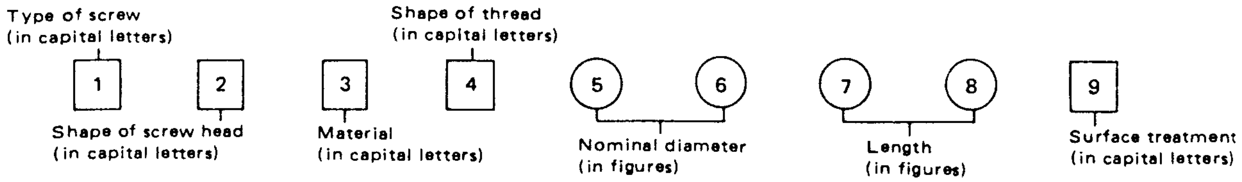
Page
5.1 STANDARD PART NUMBER CODING .... 5 - 2
  5.1.1 Screw coding .... 5 - 2

5.2 EXPLODED VIEWS AND PARTS LIST .... 5 - 3
  5.2.1 Packing assembly [M1] .... 5 - 3
  5.2.2 Cabinet assembly [M2] .... 5 - 4
  5.2.3 Chassis assembly [M3] .... 5 - 5
  5.2.4 Mechanism assembly [M4] .... 5 - 6
  5.2.5 Cassette housing assembly [M5] .... 5 - 8
  5.2.6 Remote control unit [M6] 5-10

5.1 STANDARD PART NUMBER CODING

5.1.1 Screw coding

Standard screw part numbers are as follows.


Type of screw
(in capital letters)
Shape of thread
(in capital letters)
1
2
3
4
5
6
7
8
9
Shape of screw head
(in capital letters)
Material
(in capital letters)
Nominal diameter
(in figures)
Length
(in figures)
Surface treatment
(in capital letters)

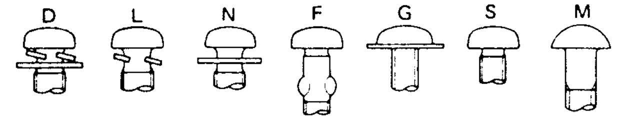
Type of screw (first digit)

S	Normal screws
D	Assembled machine screws (with plain and spring washers)
L	" (with spring washer)
N	" (with plain washer)
F	Feather screws
G	Washer head tapping screws
M	Wood screws

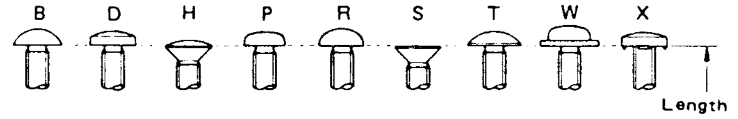
Shape of screw head (second digit)

B	Brazier head
D	Binding head
H	Oval countersunk head
P	Pan head
R	Round head
S	Flat head
T	Truss head
W	Washer head (machine screws)
X	Toothed head

–Type of screw (first digit) –



– Shape of screw head (second digit) –


B
D
H
P
R
S
T
W
X
Length

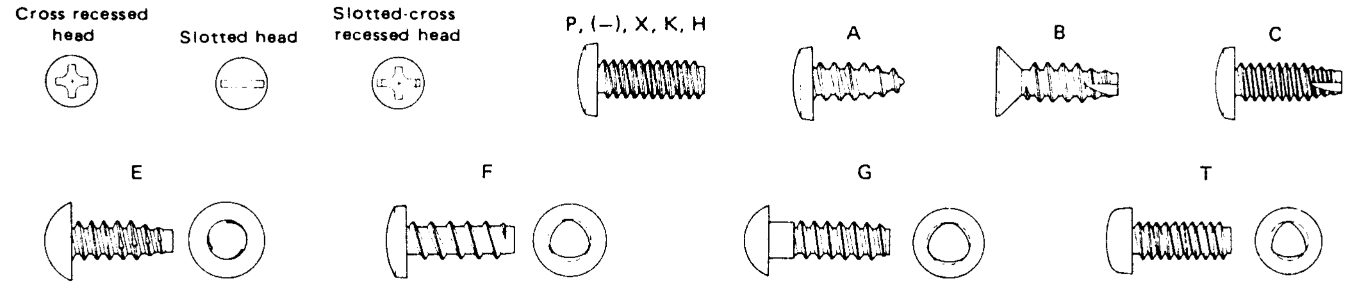
Material (third digit)

S	Steel
E	Stainless steel
C	Cast iron
U	Copper
B	Brass
P	Phosphor bronze
N	Nickel silver
Y	Cast brass
A	Aluminum
Z	Zinc alloy
K	Polycarbonate

Shape of thread (fourth digit)

P	Cross recessed head screws
(–)	Slotted head machine screws
X	Slotted-cross recessed head machine screws
K	Cross recessed head machine screws for precision equipment (type 1)
H	" (type 3)
A	Cross recessed head tapping screws (type 1)
B	" (type 2)
C	" (type 3)
E	Cross recessed head special tapping screws (brand : evertight)
F	" (brand : P-tight)
T	" (brand : taptight)
G	"

– Shape of thread (fourth digit) –


Cross recessed head
Slotted head
Slotted-cross recessed head
P, (–), X, K, H
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Nominal diameter (fifth and sixth digits)

The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

Length (seventh and eighth digits)

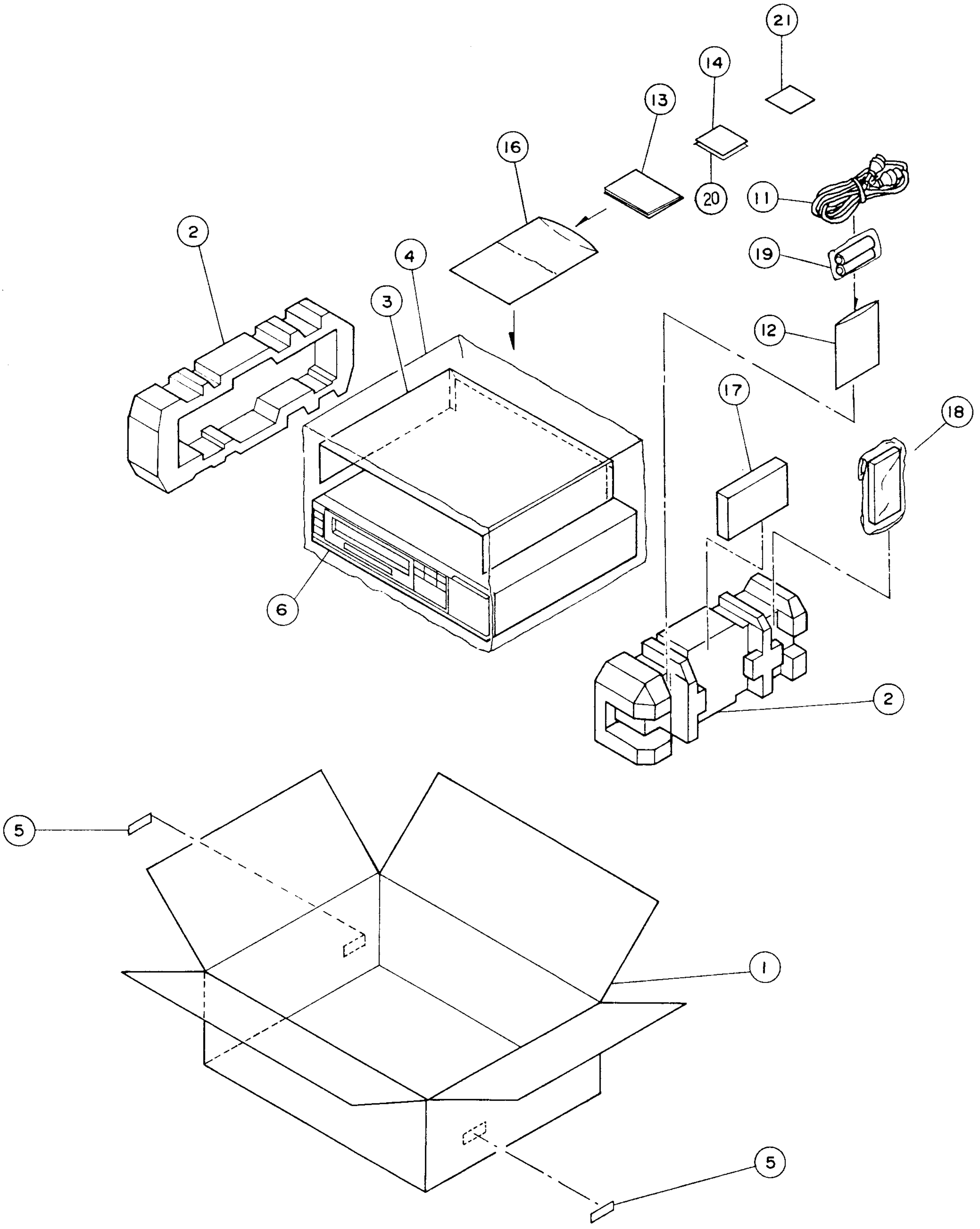
The seventh and eighth digits are numbers indicating length in milimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

Surface treatment (ninth digit)

Z	Dichromate treatment after galvanizing (MFZn II-C)
N	Nickel plating (MFNi II, MFNi I)
R	Chromium plating (MBCr II, MBCr I)
G	Silver plating (SP4)
B	Black coating after plating
F	Blackening of iron (FB)
M	Blackening after galvanizing
K	Pickling of brass (PF2)
P	Phosphate treatment
W	Uni-chrome plating
L	Coating with transparent paint
A	Coloring red after galvanizing (MFZn II-C)
C	Coloring blue after galvanizing (MFZn II-C)
T	Coloring green after galvanizing (MFZn II-C)
V	Coloring purple after galvanizing (MFZn II-C)

5.2 EXPLODED VIEWS AND PARTS LIST

5.2.1 Packing assembly [M1]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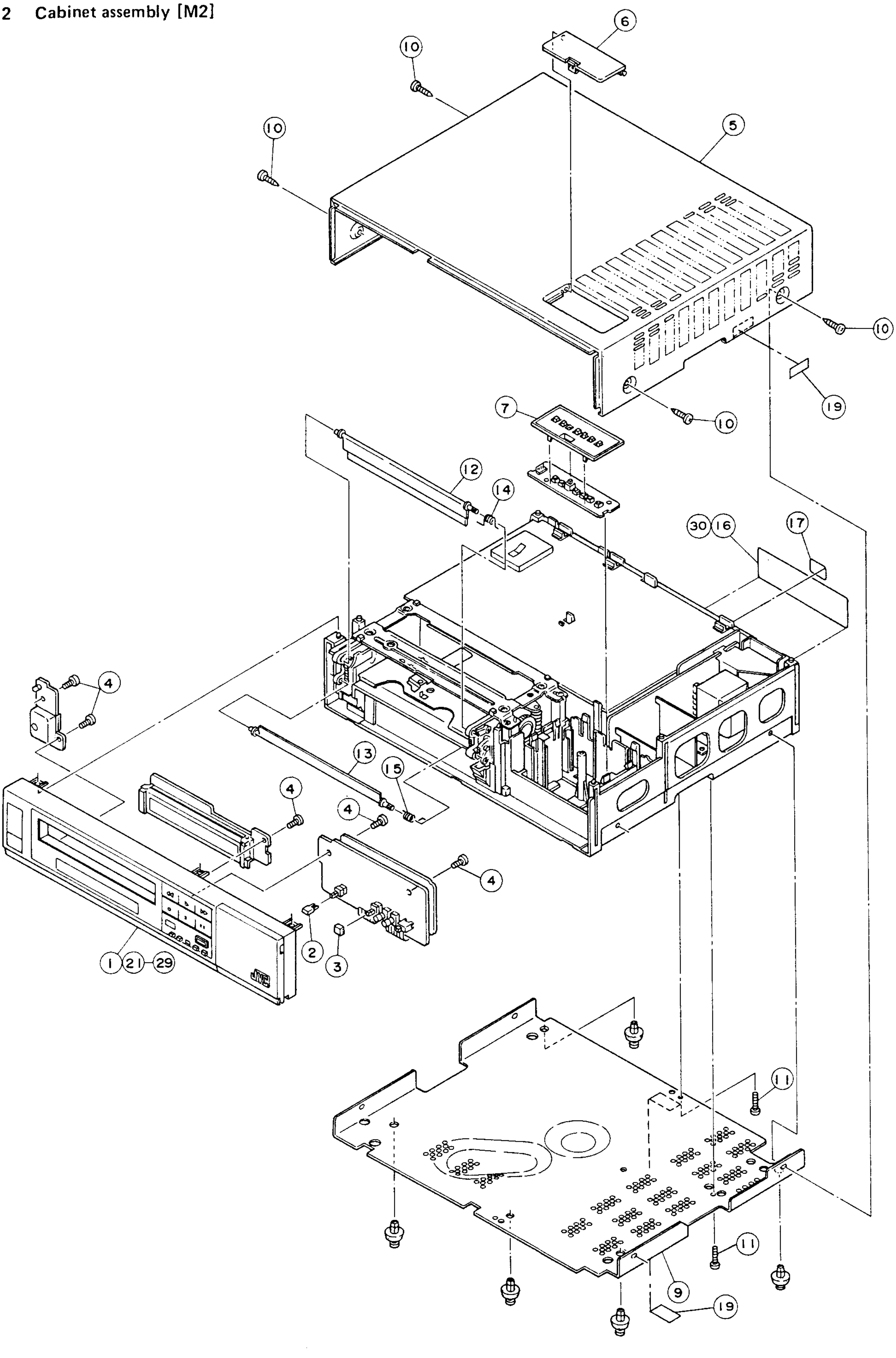
Packing and accessories [M 1]

Symbol No.	Part No.	Part Name	Description	Q'ty
1	PQ30692-65	Packing Case	E	1
	〃 -57	〃	EG	1
	〃 -64	〃	EK	1
2	PQ30693A-3	Cushion Assembly	Right and Left	1
3	PQ41026-3	Protect Sheet		1
4	PUP30321-33	Poly Bag		1
5	PUP40329	Serial No. Sticker		4
6	–	–		–
7	–	–		–
8	–	–		–
9	–	–		–
10	–	–		–
⚠ 11	PU55906	Aerial Cable Assembly		1
12	QPGA023-02003	Poly Bag	E, EG	1
	PQM30023-8	〃	EK	1
⚠ 13	PU30425-778	Instruction Book	E	1
⚠	〃 -763	〃	EG	1
⚠	〃 -777	〃	EK	1
14	BT-20069A	Warranty Card	EG	1
	BT-20060	〃	EK	1
⚠ 15	–	–		–
16	QPGA025-03505	Poly Bag	E, EG	1
	PQM30023-5	〃	EK	1
17	PTE-30-101	Cassette Tape		1
⚠ 18	PQ10244G-4	Remote Control Unit	E, EK Refer to [M6], Incl. Poly Bag	1
⚠	PQ10244F-4	〃	EG 〃 〃	1
⚠ 19	UM-3DJ2P	Battery	2 pieces	1
20	BT-20066	Guaranty Card	EK only	1
21	PU35247	F. Information Sheet	EG only	1

NOTE: [M□] indicates mechanical symbol number.

5.2.2 Cabinet assembly [M2]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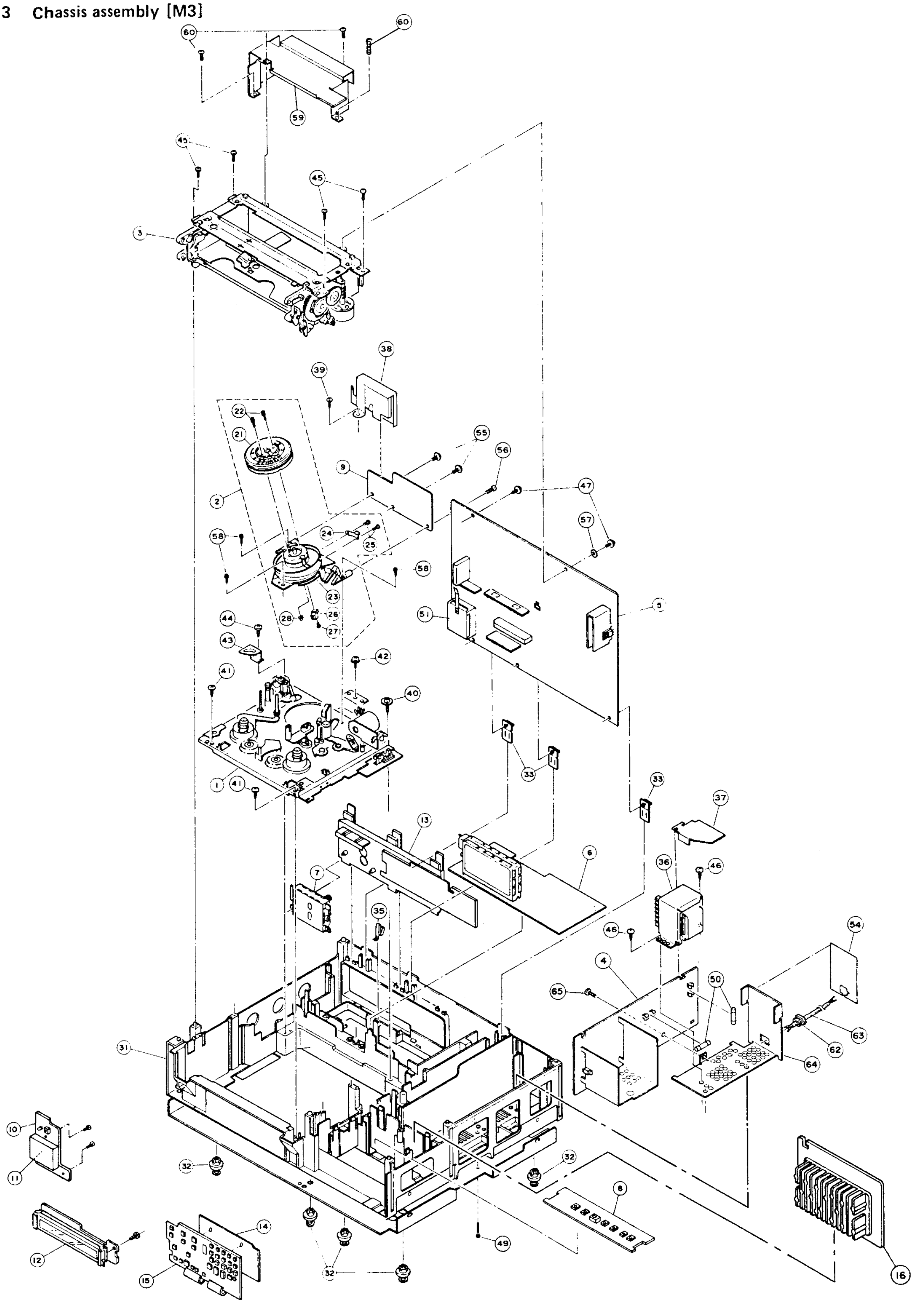
Cabinet assembly [M2]

Symbol No.	Part No.	Part Name	Description	Q'ty
⚠ 1	PQ10231C-6	Front Panel Assembly	E, EK Incl. 21 – 29	1
	PQ10231A-6	"	EG "	1
2	PQ30590-3	Button	MEMORY	1
3	PQ41554	"	TIMER	1
4	SDSA3008Z	Tapping Screw	P. SW, DISPLAY, OPERATION boards	5
⚠ 5	PQ10148-4	Top Cover		1
6	PU35584-8	Channel Cover		1
7	PQ30784B	Button Assembly	E CH SET	1
	PQ30784A-2	"	EG "	1
	PQ30784H	"	EK "	1
8	–	–		–
⚠ 9	PQ10122-1-6	Bottom Cover		1
10	SDSA4014M	Tapping Screw	Top Cover	4
11	SDSF3012Z	"	Bottom Cover	2
12	PQ30107BS-19	Upper Door Assembly		1
13	PQ30030-8-15	Lower Door		1
14	PQ40104-2	Spring	Upper Door	1
15	PQ40472	"	Lower Door	1
⚠ 16	PU35598-26-10	Rating Label	E	1
⚠	" -21	"	EG	1
⚠	" -25	"	EK	1
17	PQ41666	Label	EG Rear Panel	1
	PQ41700	"	EK "	1
18	–	–		–
19	PU58020-3	Caution Label	EK only	2
20	–	–		–
21	PQ41555F	Button Assembly	E, EK POWER	1
	PQ41555E	"	EG "	1
22	PQ30596	IFR Window	Infrared	1
23	PQ30819	Button	EJECT	3
24	PQ30820	"	INSTANT RECORD	1
25	PQ30582-17-10	Door	E Program	1
	" -6-10	"	EG "	1
	" -16-10	"	EK "	1
26	PU35597-6	Program Label	E	1
	" -1-3	"	EG	1
	" -2	"	EK	1
27	PQ30584-9	Program Plate	E, EK	1
	" -5	"	EG	1
28	PQ41501	Mark	JVC	1
29	PQM30002-99	Spring	POWER Button	1
⚠ 30	–	BEAB Mark	E, EG	1
⚠	–	"	EK	1

NOTE: [M□] indicates mechanical symbol number.

5.2.3 Chassis assembly [M3]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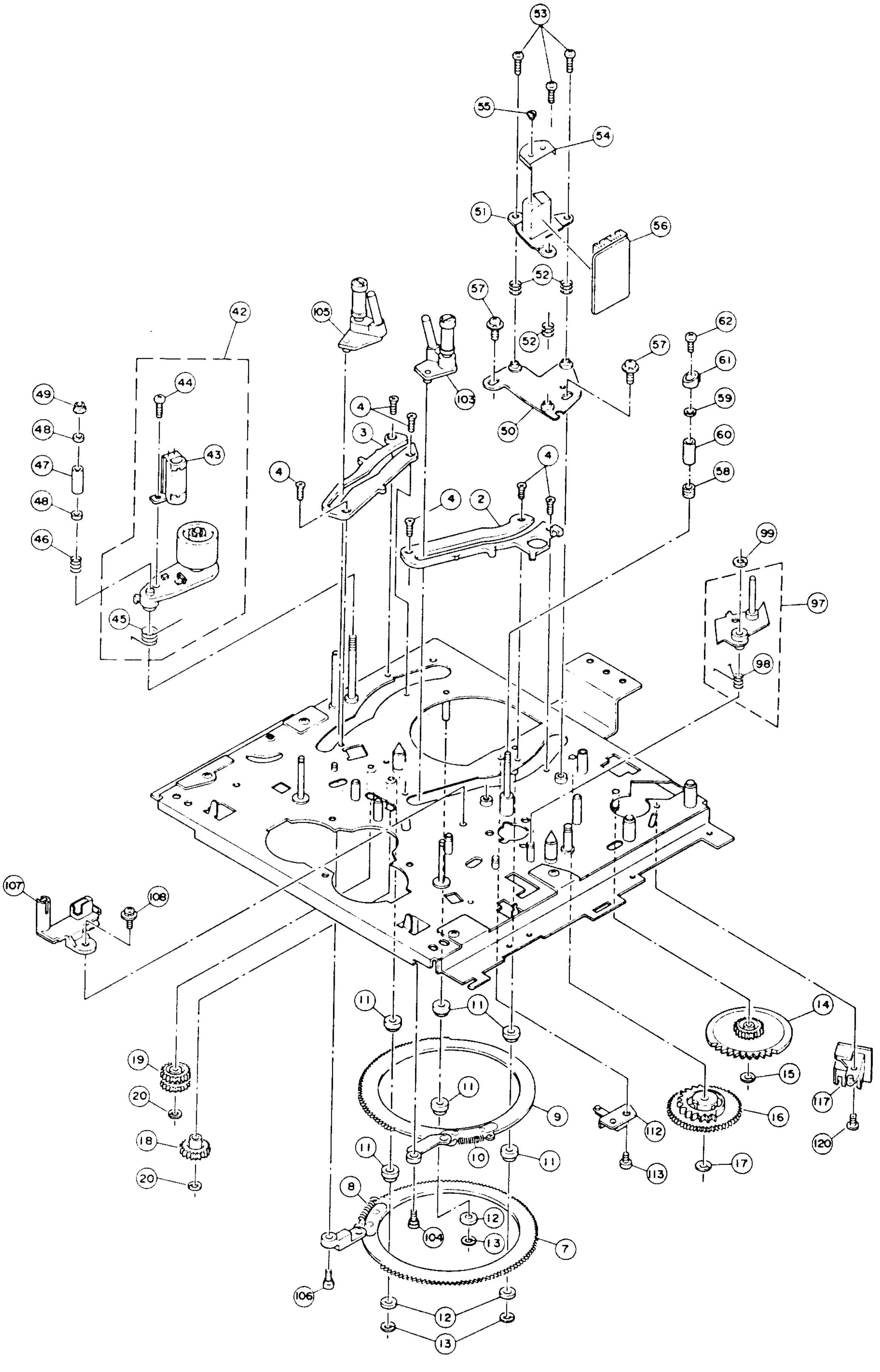
Chassis assembly [M3]

Symbol No.	Part No.	Part Name	Description	Q'ty
1	–	Mechanism Assembly	Refer to [M4]	1
⚠ 2	–	Drum Assembly	Refer to 21 – 28	1
3	–	Cassette Housing Assembly	Refer to [M5]	1
4	–	Power Supply Board Assembly	Refer to [0 1]	1
5	–	Main Board Assembly	Refer to [0 2]	1
6	–	Tuner/IF Board Assembly	Refer to [0 4]	1
7	–	RF Converter & Mixer	Refer to [1 0]	1
8	–	Presetter Board Assembly	Refer to [3 5]	1
9	–	Head/MDA Board Assembly	Refer to [0 8]	1
10	–	Power Switch Board Assembly	Refer to [3 1]	1
11	–	IFR Board Assembly	Refer to [1 6]	1
12	–	Display Board Assembly	Refer to [3 2]	1
13	–	Terminal Board Assembly	Refer to [0 3]	1
14	–	Timer Board Assembly	Refer to [3 4]	1
15	–	Operation Board Assembly	Refer to [3 3]	1
16	–	Heat Sink Board Assembly	Refer to [1 7]	1
21	PQ20020B	Upper Drum Assembly		1
22	NDBP2608N	Screw	Upper Drum	2
⚠ 23	PQ20024R-22	Drum Motor Assembly	Incl. 24 – 28	1
24	PU56202-5	Heater		1
25	SDBP2603N	Screw	Heater	2
26	PU57619	Pick-up Head		1
27	SPSH1735Z	Screw (Precision)	Pick-up Head	1
28	PU49483-3	Commutator		1
⚠ 31	–	Chassis		1
32	PU57662-1-1	Foot		5
33	PU58018-1-2	Hinge	Main Board	3
34	–	–		–
35	PQ41476-1-1	Earth Spring	GND	1
⚠ 36	PU58470	Power Transformer	E, EG	1
⚠	PU58506	″	EK	1
⚠ 37	PQ30500-1-5	AC Cover		1
38	PU57677-1-3	Shield Case	Head/MDA Board	1
39	SPST3008Z	Tapping Screw	Shield Case	1
40	PQ40413	Special Screw	Main-deck	1
41	SDSA4012Z	Tapping Screw	″	2
42	PQ41396	Special Screw	″	1
43	PQ41804-1-1	Bracket		1
44	SDSA4012Z	Tapping Screw	Bracket	1
45	SDSF3012Z	″	Cassette Housing	4
⚠ 46	SDSA4012Z	″	Power Transformer	2
47	DPSP3006Z	Screw	Main Board	2
48	–	–		–
⚠ 49	SDST3014Z	Tapping Screw	GND	1
⚠ 50	–	Fuse	Refer to [0 1]	2
51	PU58584A	Shield Ass'y	Main Board (Preamp)	1
52	–	–		–
53	–	–		–
54	PQ30694	Bracket Sheet		1
55	DPSP2606Z	Screw	Head/MDA Board	2
56	LPSP2606Z	″	″	1
57	Q03093-502	Washer	Main Board	1
58	LPSP3008Z	Screw	Drum	3
59	–	Fuse	Refer to [0 1]	1
60	PQ30772A-1	Shield Ass'y	Drum	3
61	–	–		–
⚠ 62	QHS3771-108	Strain Relief	Power Cord	1
⚠ 63	QMP3980-200	Power Cord	E, EG	1
⚠	QMP5140-200	″	EK	1
⚠ 64	PQ30691-1-2	Bracket	Power Transformer	1
⚠ 65	SDST3006Z	Tapping Screw	Bracket	1

NOTES: [M☐] indicates mechanical symbol number. [2 digits] indicates circuit board symbol number.

5.2.4 Mechanism assembly [M4]



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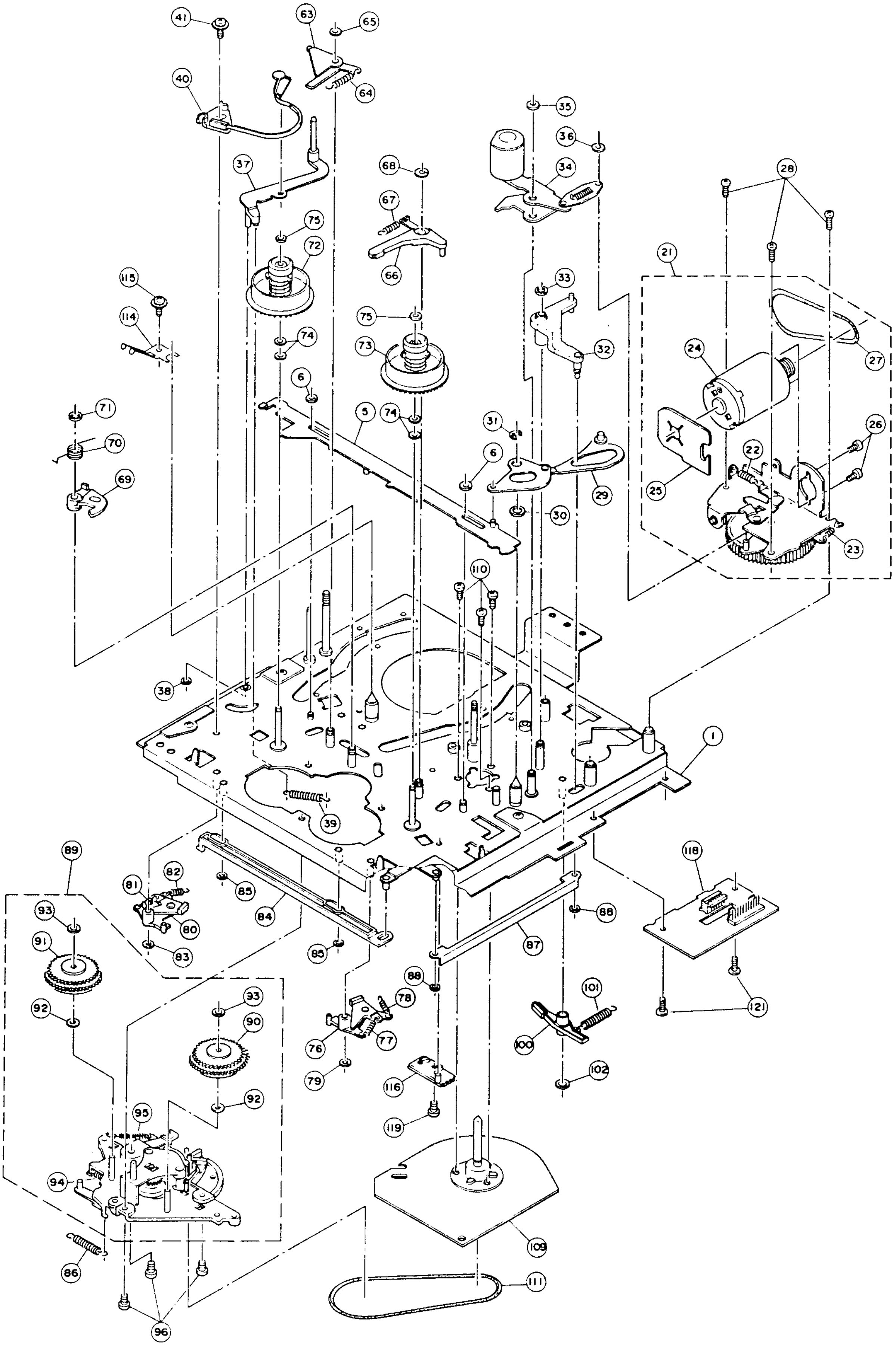


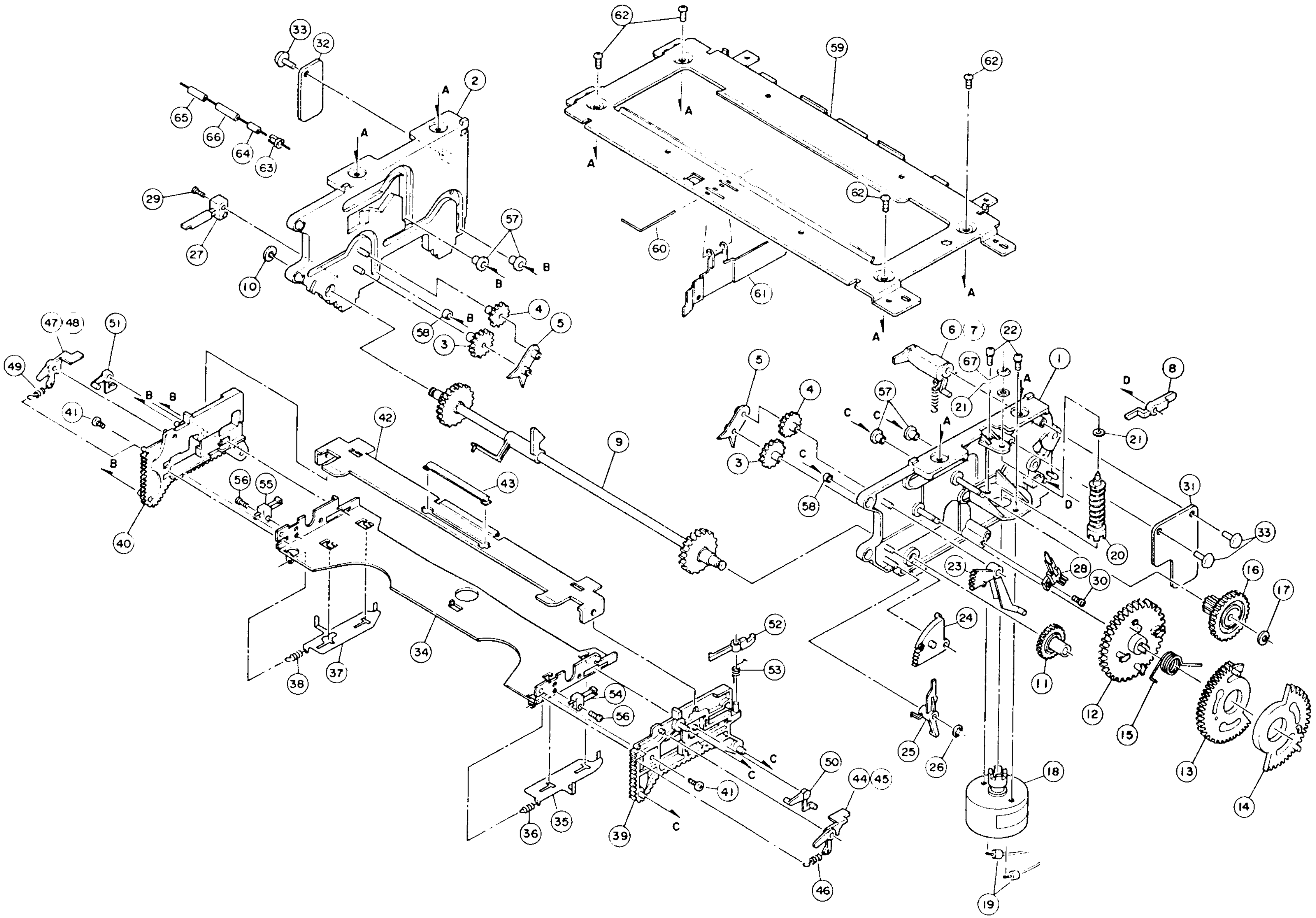
Mechanism assembly [M4]

Symbol No.	Part No.	Part Name	Description	Q'ty
1	–	Main-deck Assembly		1
2	PQ30486	Loading Guide (T)		1
3	PQ30487	Loading Guide (S)		1
4	PQ41269	Special Screw	Loading Guides	6
5	PQ30130B-3	Slide Plate Assembly		1
6	PQM30017-8	Slit Washer	Slide Plate	2
7	PQ40223B	Loading Ring Assembly (S)	Incl. 8	1
8	PQM30001-151	Spring		1
9	PQ40227B	Loading Ring Assembly (T)	Incl. 10	1
10	PQM30001-151	Spring		1
11	PQ40213	Collar		6
12	PQM30005-29	″		3
13	PQM30017-4	Slit Washer	Loading Rings	3
14	PQ30489	Loading Gear (1)		1
15	PQM30017-12	Slit Washer	Loading Gear (1)	1
16	PQ41354A	Loading Gear (2) Assembly		1
17	PQM30017-12	Slit Washer	Loading Gear (2)	1
18	PQ40219	Connect Gear (1)		1
19	PQ40220	Connect Gear (2)		1
20	PQM30017-8	Slit Washer	Connect Gears	2
21	PUS36689M	Drive Gear Bracket Assembly	Incl. 22 – 27	1
22	PQM30001-129	Spring		1
23	″ -130	″		1
⚠ 24	PQ40244A-2	Motor Assembly	Mode Control	1
25	–	Motor Board Assembly	refer to [30]	1
26	SPSP3003Z	Screw	Motor	2
27	PQM30003-14	Belt	Mode Control	1
28	SDSP2608Z	Screw	Drive Gear Bracket	3
29	PQ40246A	Lever Assembly		1
30	PQM30005-41	Collar		1
31	REE4000	E-Ring	Lever	1
32	PQ41847A	Cam Arm Assembly		1
33	PQM30017-12	Slit Washer	Cam Arm	1
34	PQ40252B-4	Pinch Roller Arm Assembly		1
35	PQM30017-12	Slit Washer	Pinch Roller Arm	1
36	″ -8	″	″	1
37	PQ41364A	Tension Arm Assembly		1
38	PQM30017	Slit Washer	Tension Arm	1
39	PQM30001-186	Spring	Back Tension	1
40	PQ41370B	Tension Band Assembly		1
41	DPSP3006Z	Screw	Tension Band	1
42	PQ41374D	Full Erase Head Arm Assembly	Incl. 43 – 45	1
43	PU57641	Full Erase Head		1
44	SPSG2608Z	Tapping Screw	Full Erase Head	1
45	PQ40427	Spring		1
46	PQM30002-112	″		1
47	PU53629-2	Tape Guide	Supply Guide Pole	1
48	PQ40752	Guide Flange		2
49	PQ40353	Nylon Nut	Erase Head Arm	1
50	PQ41376A-1	Head Base Assembly	Audio/Control Head	1
51	PU58036	Audio/Control Head		1
52	PU30080-49	Spring		3
53	SPSP2608Z	Screw	Audio/Control Head	3
54	PU55535	Shield Cap		1
55	HPSP2015N	Screw	Shield Cap	1
56	–	Audio/Control Head Board Ass'y	refer to [12]	1
57	DPSP2608Z	Screw	Head Base	2
58	PQ41348-2	Guide Flange (T)		1
59	PQ40268-2	Guide Flange		1
60	PU53629-2	Tape Guide	Take-up Guide Pole	1

NOTES: [M] indicates mechanical symbol number.
[2 digits] indicates circuit board symbol number.

Symbol No.	Part No.	Part Name	Description	Q'ty
61	PQ41346	Guide Pole Cap		1
62	SDSP2006Z	Screw	Tape Guide	1
63	PQ40274A-2	Loading Brake (S) Assembly	Incl. 64	1
64	PQM30001-175	Spring		1
65	PQM30017-12	Slit Washer	Loading Brake (S)	1
66	PQ40276A-2	Loading Brake (T) Assembly	Incl. 67	1
67	PQM30001-171	Spring		1
68	PQM30017-12	Slit Washer	Loading Brake (T)	1
69	PQ41379A	Gear Lever Assembly		1
70	PQ41162-1-2	Spring		1
71	PQM30017-13	Slit Washer	Gear Lever	1
72	PU57644-1-1	Reel Disk (S)		1
73	PU57645	" (T)		1
74	Q03093-828	Washer		4
75	PQM30017-5	Slit Washer	Reel Disks	2
76	PQ40285A	Main Brake (T) Assembly	Incl. 77 and 78	1
77	PQM30001-135	Spring		1
78	" -136	"		1
79	PQM30017-12	Slit Washer	Main Brake (T)	1
80	PQ40288A	Main Brake (S) Assembly	Incl. 81 – 82	1
81	PQM30001-135	Spring		1
82	" -136	"		1
83	PQM30017-12	Slit Washer	Main Brake (S)	1
84	PQ30133-1-5	Main Brake Slider		1
85	PQM30017-8	Slit Washer	Main Brake Slider	2
86	PQM30001-178	Spring		1
87	PQ40291	Push Plate		1
88	PQM30017-8	Slit Washer	Push Plate	2
89	PU57658B-4	Clutch Mechanism Assembly	Incl. 90 – 95	1
90	PU56043-1-4	Clutch (T)		1
91	PU56044-2-5	" (S)		1
92	Q03093-827	Washer		2
93	PQM30017-2	Slit Washer	Clutches	2
94	PQM30001-140	Spring		1
95	" -139	"		1
96	SPSP3006Z	Screw	Clutch Mechanism	6
97	PQ41384A	Guide Arm Assembly	Incl. 98	1
98	PQ41405	Spring		1
99	PQM30017-8	Slit Washer	Guide Arm	1
100	PQ41389B	Motor Brake Assembly	Incl. 101	1
101	PQM30001-187	Spring		1
102	PQM30017-12	Slit Washer	Motor Brake	1
103	PQ40354E-3	Pole Base (T) Assembly		1
104	PQ40295	Flange Screw	Pole Base (T)	1
105	PQ40357B-2	Pole Base (S) Assembly	or PQ40357A-2	1
106	PQ40295	Flange Screw	Pole Base (S)	1
107	–	LED Board Assembly	refer to [15]	1
108	DPSP3006Z	Screw	LED Board	1
⚠109	PU57647V	Capstan Motor		1
110	SDSP2603Z	Screw	Capstan Motor	3
111	PQM30003-10	Belt	Reel	1
112	PU56930-2	Brush Assembly		1
113	SPSP3003Z	Screw	Brush	1
114	PQ41282	Earth Plate		1
115	DPSP3005N	Screw		1
116	–	Reel Sensor (T) Board Ass'y	refer to [22]	1
117	–	Loading Sensor Board Ass'y	refer to [14]	1
118	–	Terminal Board Assembly	refer to [20]	1
119	SPST3008Z	Tapping Screw	Reel Sensor Board	1
120	DPSP3010Z	Screw	Loading Sensor Board	1
121	SDSP2608Z	"	Terminal Board	2

5.2.5 Cassette housing assembly [M5]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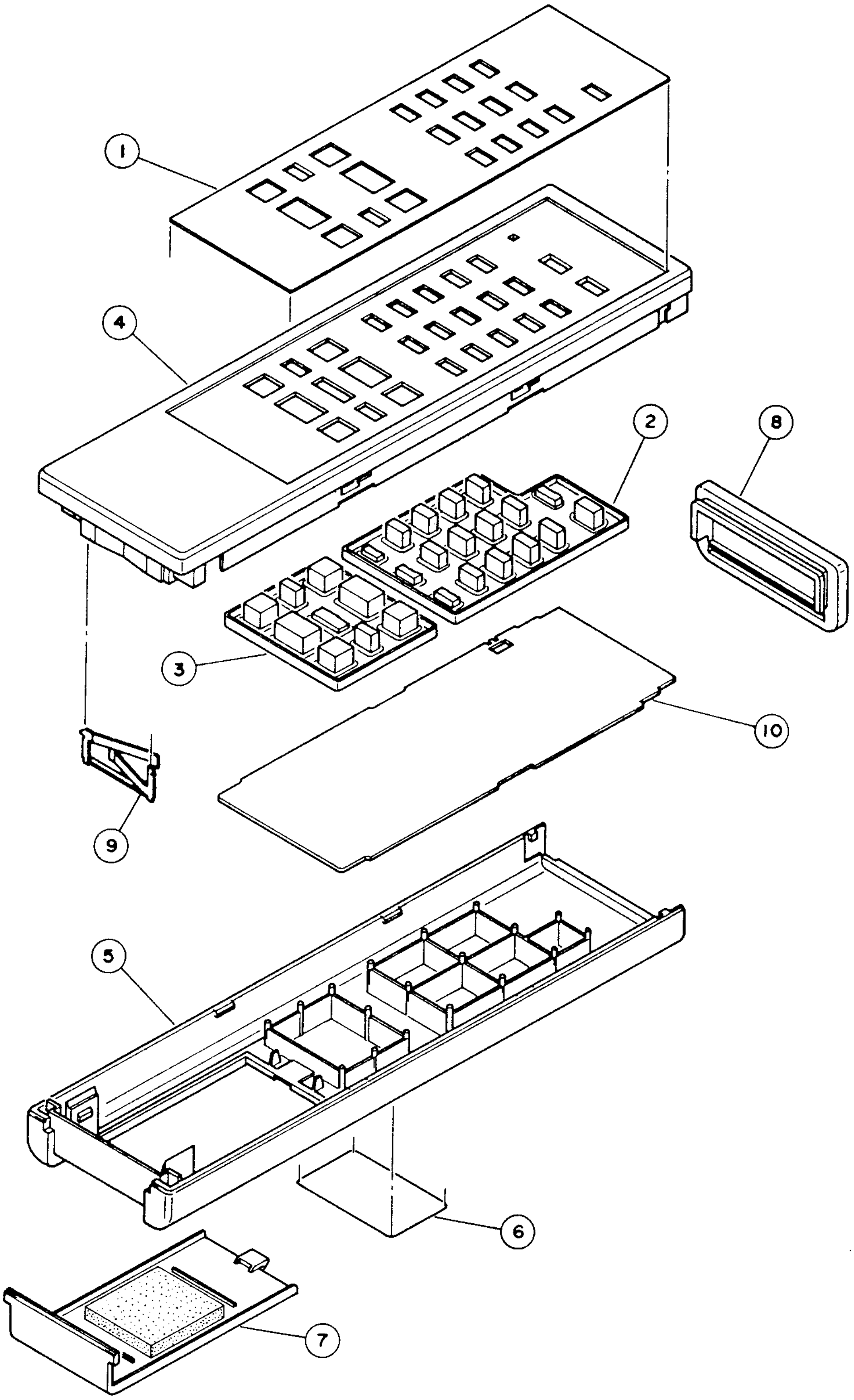
Cassette housing assembly [M5]

Symbol No.	Part No.	Part Name	Description	Q'ty
—	PUS26805K	Cassette Housing Assembly	Incl. 1—67	1
1	PQ30033D-4	Guide Stay (R) Assembly		1
2	PQ30276B-3	Guide Stay (L) Assembly		1
3	PQ40059	Gear (1)	left and right	2
4	PQ40060	Gear (2)	left and right	2
5	PQ40061	Double Cap		2
6	PQ40102A-1	Door Guide Assembly	Incl. 7, Guide Stay (R)	1
7	PUM30001-111	Spring		1
8	PQ40063	Guide Lever	Guide Stay (R)	1
9	PQ40103A	Connect Gear Assembly		1
10	PUM30017-11	Slit Washer	Connect Gear Assembly	1
11	PQ40065	Cam Gear (2)	Guide Stay (R)	1
12	PQ30028	Cam Gear (1)		1
13	PQ40066-1-2	Loading Slide Gear		1
14	PQ40067-1-2	UL Slide Gear	unloading	1
15	PQ40068-2	Limiter Spring	Cam Gear (1)	1
16	PQ40484	Worm Wheel		1
17	PUM30017-4	Slit Washer	Worm Assembly	1
⚠ 18	PQ40090A	Motor Assembly	cassette motor	1
19	PU45811	Fibber Beads	Motor Assembly	2
20	PQ40091B	Worm Assembly		1
21	Q03093-838	Washer	Worm Assembly	2
22	SPSP2604Z	Screw	Motor Assembly	2
23	PQ40074	Upper Door Opener		1
24	PQ40075-1-5	Lower Door Opener		1
25	PQ40076-2	Hold Lever	Lower Door Opener	1
26	REE2500X	E-Ring	Hold Lever	1
27	PU51259-3	Leaf Switch	rec safety, Guide Stay (L)	1
28	PU55377-2	End Switch	cassette load end/eject end	1
29	SPSP2010Z	Screw	Leaf Switch	1
30	SBSE2610Z	Tapping Screw	End Switch	1
31	—	Cassette Housing Board	refer to [18]	1
32	—	End Sensor Board	refer to [13]	1
33	PU48973-3	Stopper	Cassette Housing/End Sensor Boards	3
34	PQ30031-1-3	Cassette Holder		1
35	PQ40106B-1	Slide Plate (R) Assembly	Incl. 36	1
36	PUM30001-113	Spring		1
37	PQ40107B-1	Slide Plate (L) Assembly	Incl. 38	1
38	PUM30001-113	Spring		1
39	PQ10009-1-4	Bracket (Right)		1
40	PQ10009-2-3	Bracket (Left)		1
41	SPSP2003Z	Screw	Bracket (Right/Left)	2
42	PQ30208	Reinforcement		1
43	PQ40479	Guard	Reinforcement	1
44	PQ40108B-3	Lock Lever (R) Assembly	Incl. 45,46	1
45	PQM30019-10	Pad	Lock Lever (R)	1
46	PUM30001-110	Spring		1
47	PQ40109B-3	Lock Lever (L) Assembly	Incl. 48,49	1
48	PQM30019-10	Pad		1
49	PUM30001-110	Spring		1
50	PQ40081A	Switch Lever (R) Assembly	Insert Switch (R)	1

Symbol No.	Part No.	Part Name	Description	Q'ty
51	PQ40081B	Switch Lever (L) Assembly	Insert Switch (L)	1
52	PQ40083-1-1	Lid Opener	Bracket (R)	1
53	PQ40084-1-2	Torsion Spring	Lid Opener	1
54	PU55378	Insert Switch (Right)	cassette in detector	1
55	PU55378-2	Insert Switch (Left)	cassette in detector	1
56	SPSP1704Z	Screw	Insert Switch (R/L)	2
57	PQ40086	Roller	Guide Stay (Right/Left)	4
58	PQ40087-2	Mini Roller	Guide Stay (Right/Left)	2
59	PQ20043	Roof Plate		1
60	PQ40440-1-1	Rod	Roof Plate	1
61	PQ40478-1-3	Upper Door Stopper		1
62	SBSE2608Z	Tapping Screw	Roof Plate	4
63	PQ40299	Wire Cap	Guide Stay (L)	1
64	QXT629H-020	UL Tube		1
65	QXT329H-035	UL Tube		1
66	QXTF253-040	UL Tube		1
67	PUM30017	Slit Washer	Worm Assembly	1

NOTES: [M] indicates mechanical symbol number.
[2 digits] indicates circuit board symbol number.

5.2.6 Remote control unit [M6]



①
④
②
⑧
③
⑩
⑨
⑤
⑥
⑦

Remote control unit [M6]

Symbol No.	Part No.	Part Name	Description	Q'ty
	–	Remote Control Unit	Refer to [M1], Incl. 1–10	1
1	PU35724-4-4	Top Panel	E, EK	1
	" -3-4	"	EG	1
2	PU35725-2	Button (1)		1
3	PU35604-8	" (2)		1
4	PU35726-2	Top Case		1
5	PU35423-12	Bottom Case		1
6	PU35432-42	Remocon Label	E, EK	1
	" -41	"	EG	1
7	PU35422-12	Battery Cap	E, EK Excepting Sponge	1
	" -14	"	EG "	1
8	PQ10181-004	Smoked Board	Infrared Window	1
9	" -006	Battery Terminal	Top Case	1
10	" -007	Dumper	Battery Cap	1
11	–	Remote Control Board Ass'y	Refer to [40]	1

NOTES: [M□] indicates mechanical symbol number.
[2 digits] indicates circuit board symbol number.

SECTION 6
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

RESISTORS – All resistance values are in ohms (Ω).

K : 1 000
M : 1 000 000
CR : Carbon Resistor
Comp. R : Composition Resistor
WR : Wire Wound Resistor
OMR : Oxide Metal Film Resistor
VR : Variable Resistor (Potentiometer)
MFR : Metal Film Resistor
FR : Fusible Resistor
PMR : Precision Metal Film Resistor

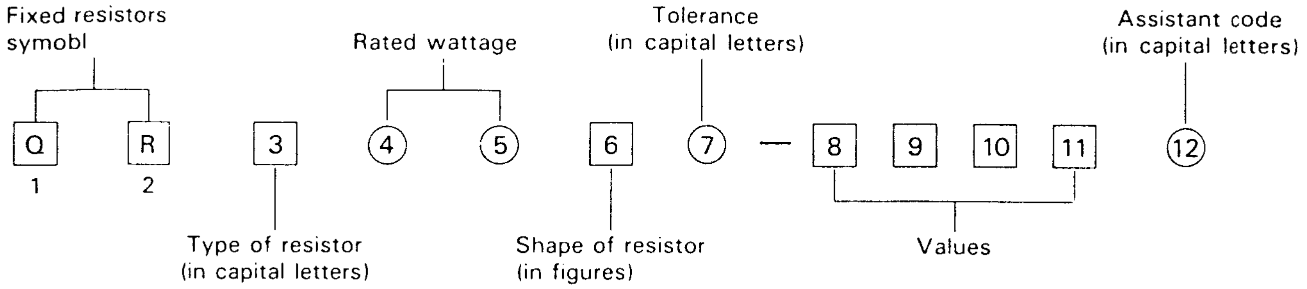
CAPACITORS – All capacitance values are in μF, unless otherwise indicated.

P : $\mu\mu$F
C Cap : Ceramic Capacitor
E Cap : Electrolytic Capacitor
FM Cap : Film Mica Capacitor
MM Cap : Metalized Mylar Capacitor
MP Cap : Metalized Paper Capacitor
MY Cap : Mylar Capacitor
NP Cap : Non-polar Capacitor
PC Cap : Polycarbonate Capacitor
PP Cap : Poly Pro Capacitor
PS Cap : Polystyrol Capacitor
T Cap : Tantalum Capacitor
TR Cap : Trimmer Capacitor
LL Cap : Low Leak Current Electrolytic Capacitor
TF Cap : Thin Film Capacitor

6.1 STANDARD PART NUMBER CODING

6.1.1 Fixed resistor coding

Fixed resistor part numbers are as follows.


Fixed resistors symobl
Rated wattage
Tolerance (in capital letters)
Assistant code (in capital letters)
Q
R
1
2
3
④
⑤
6
⑦
—
8
9
10
11
⑫
Type of resistor (in capital letters)
Shape of resistor (in figures)
Values

Type of resistor (third digit)

C	Composition resistors
D	Carbon film resistors
F	Unflammable resistors
G	Oxide metal film resistors
H	Fusible resistors
M	Metal plate resistors
S	Metal glazed resistors
V	Precision metal film resistors
W	Wire wound resistors
X	Metal film resistors
Z	Special resistors

Rated wattage (fourth and fifth digits)

A0	1/10 W
18	1/8 W
16	1/6 W
14	1/4 W
12	1/2 W
01	1 W
02	2 W
03	3 W
04	4 W
05	5 W
06	6 W
07	7 W
75	7.5 W
08	8 W
10	10 W
15	15 W
A6	16 W
20	20 W
30	30 W

Tolerance (seventh digit)

F	± 1 %
G	± 2 %
J	± 5 %
K	± 10 %
M	± 20 %

Assistant code (twelfth digit)

A	Small type
B	Small type
S	Small type
Y	Lead taping
Z	Lead taping

Values (eighth – tenth or eleventh digits)

examples:

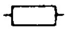
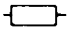
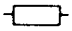
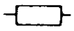
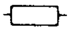
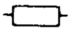
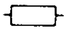
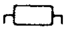
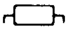
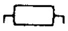
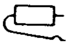
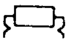
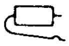
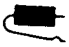
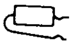
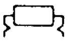
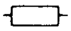
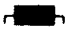
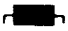
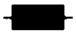
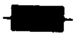
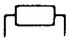
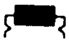
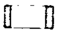
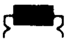
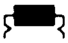
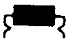
R47		0.47 Ω
4R7		4.7 Ω
470	47×10^0	47 Ω
471	47×10^1	470 Ω
472	47×10^2	4.7 kΩ
473	47×10^3	47 kΩ
474	47×10^4	470 kΩ
475	47×10^5	4.7 MΩ

QRV resistance shown by four digits:

4640	464×10^0	464 Ω
4641	464×10^1	4.64 kΩ
4642	464×10^2	46.4 kΩ

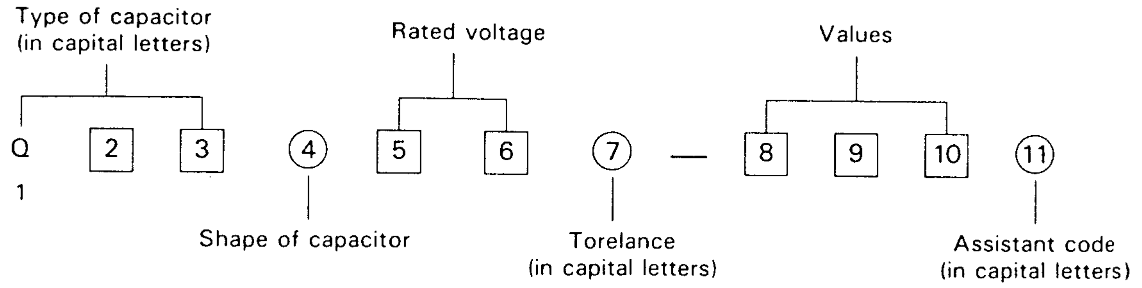
Shape of resistor (sixth digit)

Note: ■ marks are flame retardant resistor.

Shape of resistor \ Type of resistor	C	D	F	G	H	M	S	V	W	X
1										
2										
3										
4										
5									(L) type	
6										
7			Lug (B) type							
8			Lug (A) type				 Chip			
9			Lug (C) type							

6.1.2 Fixed capacitor coding

Fixed capacitor part numbers are as follows.


Type of capacitor
(in capital letters)
Rated voltage
Values
Q
1
2
3
4
5
6
7
—
8
9
10
11
Shape of capacitor
Torelance
(in capital letters)
Assistant code
(in capital letters)

Ceramic capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Mono-direction	Kink lead	Axial lead	Axial forming lead	Chip
QCC	Ceramic	1		4	5	
QCD	High capacitance					A
QCF	High capacitance	1,4	3			8,A
QCS	Temperature compensation	1	3	4	5	8,A
QCT	Temperature compensation	Special coding				8,A
QCV	Ceramic			1	3	
QCX	Ceramic			1	3	
QCY	High capacitance	1,4	3	6	7	8,A
QCZ	Special type	Special coding				

Electrolytic capacitors

Type of capacitor (first-third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEB	Low leakage		4	5	6	
QEC	Low leakage		4,8,A	9,B	6,C	
QEE	Tantalum (normal)		4	5	6	
	Tantalum (small)		8			
QEF	Chip tantalum	8 (chip type)				
QEG	Low impedance		4			
QEK	Miniature type		4	5	6	
QEL	Small type		4	5	6	7
QEM	Small type		4	5	6	
QEN	Non-polar	2	4	5	6	
QEP	Non-polar (small)		4,A	5,B	6,C	
QER	Miniature type		4	5	6	
QET	Small type	2	4	5,B	6,C	7
QEU	Small type		4	5	6	
QEV	Small type		4		6	7
QEW	Normal	2	4	5	6	7

Paper film capacitors

Type of capacitor (first — third digits)		Shape of capacitor (fourth digit)				
		Tubular	Normal		Flame retardant	
Symbol	Characteristics		Mono-direction	Kink lead	Mono-direction	Kink lead
QFA	Metalized polypropylene				7	
QFE	Metalized mylar				5	
QFF	Film mica		4			
QFG	Polypropylene film		4	8		
QFH	Metalized mylar	2	4	3	5,7	6
QFJ	Mylar (special)		4			
QFK	Metalized mylar (small)				5	
QFM	Mylar	2	4	3,7	5	6
QFN	Mylar (small)		4	3		
QFP	Polypropylene		4	3,8		
QFS	Polystyrole	2	4	3		
QFV	Thin film		4	8		
QFZ	Special type	Special coding				

Rated voltage (fifth and sixth digits)

Sixth digit / Fifth digit	A	B	C	D	E	F	G	H	J	K	V	W	X
0						3.15	4.0		6.3				
1	10		16	20	25		40	50	63	80	35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

Tolerance (seventh digit)

A	$^{+100}_{-10}$ %	M	±20 %
F	±1 %	N	±30 %
G	±2 %	P	$^{+100}_{-0}$ %
H	$^{+50}_{-10}$ %	R	$^{+30}_{-10}$ %
J	±5 %	X	$^{+40}_{-20}$ %
K	±10 %	Z	$^{+80}_{-20}$ %

Values (eighth — tenth digits)

Example : Values are in picofarads

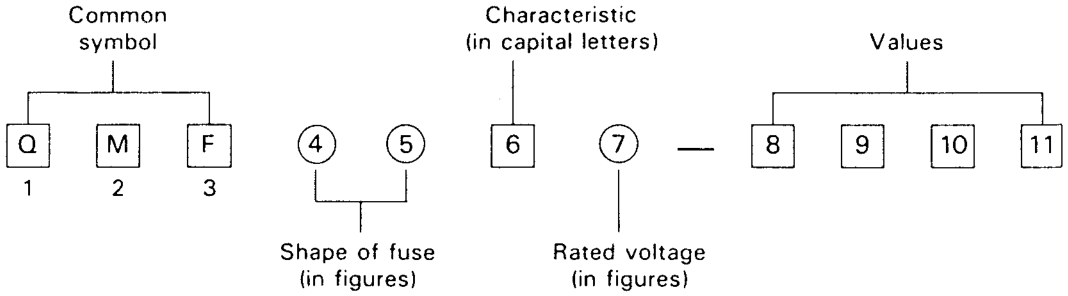
101	.............10×10^1 pF.............	100 pF
102	.............10×10^2 pF.............	1,000 pF (0.001 μF)
103	.............10×10^3 pF.............	10,000 pF (0.01 μF)
104	.............10×10^4 pF.............	100,000 pF (0.1 μF)
105	.............10×10^5 pF.............	1 μF
5R0	....	5.0 pF

Assistant code (eleventh digit)

G	Small size
Z	Lead taping

6.1.3 Fuse coding

Standard fuse part numbers are as follows.


Common symbol
Characteristic (in capital letters)
Values
Q
M
F
④
⑤
6
⑦
—
8
9
10
11
1
2
3
Shape of fuse (in figures)
Rated voltage (in figures)

Shape of fuse
(fourth and fifth digits)

51	φ5.2 × 20 mm
60	φ6.4 × 30 mm
61	φ6.35 × 31.8 mm
63	φ6.4 × 30 mm with lead wires
66	φ6.35 × 31.8 mm with lead wires
00	Special type

Rated voltage
(seventh digit)

1	AC125 V
2	AC250 V
3	0.1 – 1 A : AC250 V 1.25 – 6.3 A : AC125 V

Values
(eighth-tenth or eleventh digits)
example:
R63 .... 0.63 A
1R0 .... 1.0 A
2R5 .... 2.5 A
100 .... 10 A
R315 .... 0.315 A
1R25 .... 1.25 A

Characteristics (sixth digit)

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO, Europe)
	275 %	0.05 – 2 sec.	
	400 %	0.01 – 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type
	200 %	Within 2 min.	
S	160 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
	700 % – 2000 %	Within 0.01 sec.	
U	135 %	Within 1 hr.	Anti-rush type (for UL)
	200 %	Within 2 min.	
	800 % – 2000 %	Within 0.01 sec.	

6.2 ELECTRICAL PARTS LIST BY ASSEMBLIES

6.2.1 Power supply board ass'y [0] [1] . . PU22072A-3 (EG) PU22072B-2 (E/EK)

Symbol No.	Part No.	Part Name	Description
⚠Q 1	2SB644R,S	Transistor	
Q 2	–	–	
Q 3	2SD637Q,R,S	Transistor	
⚠Q 4	"	"	
Q 5	–	–	
⚠Q 6	–	–	
Q 7	–	–	
⚠Q 8	–	–	
⚠Q 9	2SD637Q,R,S	Transistor	
⚠Q10	2SD638Q,R,S	"	
D 1	11E2	Diode	
⚠D 2	"	"	
D 3	RD3.9EB	Zener Diode	
⚠D 4	HZ30-2	"	or RD33EB1
⚠D 5	HZ4A2	"	
D 6	10E2	Diode	
D 7	"	"	
D 8	30D2FC	"	
D 9	"	"	
D10	HZ12C3L	Zener Diode	
D11	11E2	Diode	
⚠D12	HZ12B3L	Zener Diode	
D13	11E2	Diode	or ERA12-01V3
D14	"	"	or "
D15	"	"	or "
D16	"	"	or "
D17	"	"	or "
D18	"	"	or "
D19	"	"	or "
D20	"	"	or "
D21	"	"	or "
D22	"	"	or "
D23	HZ9A3	Zener Diode	
D24	MA150	Diode	
D25	MA161	"	
DS 1	30DC1R	Diode Stack	
R 1	QRD181J-331	CR	
⚠R 2	QRZ0052-331	FR	
R 3	QRD181J-822	CR	
R 4	" -561	"	
R 5	" -331	"	
⚠R 6	QVZ3518-331	VR	
R 7	QRD181J-222	CR	
R 8	" -272	"	
R 9	" -682	"	
R10	" -562	"	
R11	" -562	"	
R12	" -223	"	
R13	" -473	"	
R14	" -331	"	
R15	" -331	"	

Symbol No.	Part No.	Part Name	Description
R16	QRD181J-272	CR	
R17	QRG019J-182	OMF	
R18	–	–	
R19	QRD181J-102	CR	
R20	" -102	"	
C 1	QETC1JM-107	E Cap	
⚠C 2	QETB1CM-228	"	
C 3	QETC1JM-476	"	
C 4	QET61HM-106	"	
C 5	QET61CM-336	"	
C 6	QET71VM-478	"	
C 7	QCF31HP-103	C Cap	
C 8	QET61HM-106	E Cap	
C 9	QET60JM-476	"	
C10	QET61CM-107	"	
C11	QETB1VM-108	"	
C12	QET61CM-336	"	
C13	" -476	"	
⚠C14	–	–	
C15	QCF11HP-102	C Cap	
C16	" -102	"	
C17	–	–	
C18	–	–	
C19	–	–	
⚠C20	QFK52AK-473	MY Cap	
⚠C101	QFZ9022-472	MM Cap	
⚠LF 1	PU58106	Line Filter	(EG only)
CN 1	PU49215-5	Cap. Housing	
CN 2	" -5R	"	
CN 3	" -9	"	
CN 4	" -2	"	
CN 5	" -3	"	
CN 6	" -3R	"	
CN 7	" -3Y	"	
CN 8	PU43351-3	"	
⚠CP 1	ICP-F10	IC Protector	or ICP-N10
⚠CP 2	"	"	or "
⚠CP 3	ICP-F25	"	or ICP-N25
⚠CP 4	ICP-F10	"	or ICP-N10
TP	PU50766	Test Pin	TP1, GND
⚠TAB 1	A74316	Tab	AC IN
⚠HLD 1	PU57505	Fuse Holder	
CO 1	PU43092	Collor	D5
⚠F1	QMF51E2-R63	Fuse	Not included in Circuit Board Ass'y
⚠F2	" -3R15	"	
⚠F3	" -1R0	"	

PU11231A-2 (E)
PU11231B-2 (EG)

6.2.2 Main circuit board ass'y, [0] [2] . . PU11231C-2 (EK)

Symbol No.	Part No.	Part Name	Description
– Audio section –			
IC 1	AN3991K	Integrated Circuit	
IC 2	TA7361P	"	
⚠Q 1	2SD636Q,R,S	Transistor	
Q 2	DTC124EF	D. Transistor	
⚠Q 3	2SB643Q,R,S	Transistor	
Q 4	2SD636Q,R,S	"	
D 1	MA165TA	Diode	or 1SS133
D 2	"	"	or "
D 3	"	"	or "
D 4	"	"	or "
D 5	"	"	or "
R 1	QRD161J-333	CR	
R 2	" -271	"	
R 3	" -224	"	
R 4	" -822	"	
R 5	QVZ3518-222	VR	or QVZ3523-222
R 6	QRD161J-103	CR	
R 7	" -182	"	
R 8	" -152	"	
R 9	" -561	"	
R10	" -220	"	
R11	" -273	"	
R12	" -122	"	
R13	" -272	"	
R14	" -395	"	
R15	" -223	"	
R16	" -103	"	
R17	" -273	"	
R18	" -103	"	
R19	" -103	"	
R20	" -100	"	
R21	QVZ3518-104	VR	or QVZ3523-104
R22	QRD161J-333	CR	
⚠R23	QRG126J-220	OMF	or QRG129J-220
R24	QRD161J-272	CR	
R25	" -103	"	
R26	" -222	"	
R27	PU52108-100K	Posistor	10 Ω
R28	QRD161J-182	CR	
R29	" -182	"	
R30	" -182	"	

Symbol No.	Part No.	Part Name	Description
C 1	QET61AM-476	E Cap	
C 2	QFN31HJ-102	MY Cap	
C 3	QEL61HM-105	E Cap	
C 4	QEB61CM-685	LL Cap	
C 5	QFN31HJ-153	MY Cap	
C 6	QET61EM-475	E Cap	
C 7	" -475	"	
C 8	QFN31HJ-683	MY Cap	
C 9	QET61HM-105	E Cap	
C10	QCS31HJ-561	C Cap	
C11	QET61CM-336	E Cap	
C12	QET61HM-105	"	
C13	QFN31HJ-682	MY Cap	
C14	QET61CM-226	E Cap	
C15	QET61HM-474	"	
C16	QET61EM-106	"	
C17	QET61AM-336	"	
C18	QET61EM-475	"	
C19	QFN31HJ-152	MY Cap	
C20	QCS31HJ-561	C Cap	
C21	QFP32AJ-473	PP Cap	
C22	QET61CM-336	E Cap	
C23	QFN31HJ-102	MY Cap	
C24	" -332	"	
C25	QET61CM-336	E Cap	
C26	QCF31HP-102	C Cap	
L 1	PGZ00121-272J	Coil	
L 2	PU48530-561KZ	Peaking Coil	
CN 1	PU49215-7	Cap. Housing	
CN 2	" -3	"	
⚠T 1	PU57566	Osc. Transformer	
TP	PU50766	Test Pin	TP31–33
CO 1	PU43092	Color	

Symbol No.	Part No.	Part Name	Description
– Video section –			
IC101	AN3310K	Integrated Circuit	
IC102	UPD4013BC	"	
IC103	AN6392	"	
IC104	PU22199A	Y. Module	(JA006)
IC105	H8D1936	Integrated Circuit	
Q101	2SC2021Q,R,S	Transistor	
Q102	"	"	
Q103	"	"	
Q104	"	"	
Q105	"	"	
Q106	"	"	
⚠Q107	DTC124EF	D. Transistor	
⚠Q108	2SC2021Q,R,S	Transistor	
Q109	2SB641Q,R	"	
⚠Q110	2SC2021Q,R,S	"	
Q111	2SB643Q,R,S	"	
Q112	"	"	
Q113	–	–	
Q114	2SC2021Q,R,S	Transistor	
Q115	2SB641Q,R	"	
Q116	"	"	
Q117	"	"	
Q118	2SC2021Q,R,S	"	
Q119	DTC124EF	D. Transistor	
Q120	2SC2021Q,R,S	Transistor	
Q121	–	–	
Q122	2SC2021Q,R,S	Transistor	
Q123	2SB641Q,R	"	
Q124	DTC144WF	D. Transistor	
D101	1SS133	Diode	
D102	"	"	
D103	"	"	
D104	"	"	
D105	"	"	
D106	"	"	
D107	"	"	
D108	"	"	
D109	"	"	
D110	"	"	
R101	QRD161J-560	CR	
R102	" -330	"	
R103	" -560	"	
R104	" -330	"	
R105	" -3R9	"	
R106	" -562	"	
R107	" -562	"	
R108	" -3R9	"	
R109	" -561	"	
R110	" -561	"	

Symbol No.	Part No.	Part Name	Description
R111	QRD161J-272	CR	
R112	" -100	"	
R113	" -272	"	
⚠R114	" -100	"	
R115	" -561	"	
R116	" -471	"	
R117	" -561	"	
R118	" -561	"	
R119	" -102	"	
R120	" -152	"	
R121	" -272	"	
R122	" -681	"	
R123	" -683	"	
R124	" -272	"	
R125	" -562	"	
R126	" -122	"	
R127	" -222	"	
R128	" -271	"	
R129	" -391	"	
R130	QVZ3518-222	VR	
R131	QRD161J-391	CR	
R132	" -122	"	
R133	" -391	"	
R134	" -332	"	
R135	" -102	"	
R136	" -121	"	
R137	" -393	"	
R138	" -152	"	
R139	" -820	"	
R140	" -121	"	
R141	" -222	"	
R142	" -222	"	
R143	" -562	"	
R144	" -182	"	
R145	" -103	"	
R146	" -122	"	
⚠R147	PU52108-4R7	Posistor	
R148	QRD161J-473	CR	
R149	" -393	"	
R150	" -182	"	
R151	" -123	"	
R152	" -222	"	
R153	" -102	"	
R154	" -122	"	
R155	" -103	"	
R156	QRD183J-391	"	
R157	QRD161J-101	"	
R158	" -332	"	
R159	" -331	"	
R160	" -271	"	
R161	" -750	"	
R162	" -123	"	
R163	" -223	"	
R164	" -750	"	
R165	" -332	"	
R166	" -562	"	
R167	" -475	"	
R168	" -225	"	
R169	" -182	"	
R170	" -335	"	
R171	" -102	"	
R172	" -102	"	
R173	–	–	
R174	–	–	
R175	QVZ3518-102	VR	

Symbol No.	Part No.	Part Name	Description
R176	QRD161J-821	CR	
R177	" -223	"	
R178	" -564	"	
R179	" -684	"	
R180	" -182	"	
R181	" -393	"	
R182	" -472	"	
R183	" -102	"	
R184	" -103	"	
R185	" -151	"	
R186	" -272	"	
R187	" -103	"	
R188	QVZ3531-153	VR	
R189	QRD161J-223	CR	
R190	" -223	"	
C101	QFN31HK-332	MY Cap	
C102	QET61HM-474	E Cap	
C103	QFN31HK-332	MY Cap	
C104	QET61HM-474	E Cap	
C105	QCF31HP-223	C Cap	
C106	" -223	"	
C107	QCS11HJ-330	"	
C108	" -470	"	
C109	QCF31HP-223	"	
C110	QET61CM-106	E Cap	
C111	QCF31HP-103	C Cap	
C112	" -103	"	
C113	QET61CM-106	E Cap	
C114	" -106	"	
C115	QCF31HP-103	C Cap	
C116	" -103	"	
C117	QET61CM-106	E Cap	
C118	QCF31HP-472	C Cap	
C119	" -223	"	
C120	QET60JM-476	E Cap	
C121	QCF31HP-223	C Cap	
C122	QCS31HJ-150	"	
C123	" -150	"	
C124	QEE51VM-334	"	
C125	QCS31HJ-121	"	
C126	QCF31HP-103	"	
C127	QCS31HJ-330	"	
C128	QCF31HP-103	"	
C129	QCS31HJ-390	"	
C130	QET60JM-107	E Cap	
C131	QCVB1CN-103	C Cap	
C132	QCF31HP-103	"	
C133	QET61AM-336	E Cap	
C134	" -336	"	
C135	QCF31HP-223	C Cap	
C136	" -103	"	
C137	QET61HM-105	E Cap	
C138	QCS31HJ-330	C Cap	
C139	QCF31HP-223	"	
C140	" -103	"	
C141	QFJ41HJ-223	"	
C142	QET61AM-336	E Cap	
C143	QET61CM-226	"	
C144	QCF31HP-103	C Cap	
C145	QET60JM-107	E Cap	

Symbol No.	Part No.	Part Name	Description
C146	QET60JM-476	E Cap	
C147	QET61CM-106	"	
C148	QETB0JM-477	"	
C149	QEP61CM-106	"	
C150	QER61CM-106	"	
C151	QCS31HJ-151	C Cap	
C152	" -330	"	
C153	QET61HM-105	E Cap	
C154	" -105	"	
C155	" -225	"	
C156	–	–	
C157	QET61CM-106	E Cap	
C158	QCS31HJ-121	C Cap	
C159	" -121	"	
C160	" -270	"	
C161	–	–	
C162	QEM51AK-107	E Cap	
C163	QET60JM-107	"	
C164	QET61EM-335	"	
C165	QET61HM-105	"	
C166	" -225	"	
C167	QET61EM-335	"	
C168	QET61HM-225	"	
C169	QET61EM-475	"	
C170	" -335	"	
C171	QCF31HP-472	C Cap	
C172	QCS11HJ-470	"	
C173	" -470	"	
C174	QFN31HJ-333	"	
C175	" -103	"	
C176	QCF31HP-223	"	
C177	" -223	"	
C178	" -223	"	
C179	" -223	"	
C180	QCVB1CN-103	"	
C181	QET61CM-106	E Cap	
C182	QET61EM-475	"	
C183	QFN41HK-223	M Cap	
C184	" -223	"	
C185	" -223	"	
⚠ L101	PU48530-680J	Peaking Coil	
L102	" -101K	"	
L103	" -470J	"	
L104	" -101K	"	
L105	" -560J	"	
L106	" -220J	"	
L107	" -560J	"	
L108	" -101K	"	
L109	" -6R8J	"	
L110	" -101K	"	
L111	" -101K	"	
L112	–	–	
L113	PU48530-680J	Peaking Coil	
L114	" -221U	"	
L115	" -270J	"	
L116	" -101K	"	
L117	" -180J	"	
L118	" -180J	"	
L119	" -101K	"	
L120	" -121J	"	

Symbol No.	Part No.	Part Name	Description
EQ101	PU54838	Equalizer	(E/EG)
LPF101	PU58021-2	Low Pass Filter	
DL101	PGZ00149	1H Delay Line	
TP	PU50766	Test Pin	TP104, 106, 110, 122, GND, GND, GND
SHL 1	PU58387	Shield Case (1)	
SHL 2	PU58389	" (3)	

Symbol No.	Part No.	Part Name	Description
– Color modulator –			
IC201	PU22046A	C. Modulator	(JA005)
IC202	BA7007	Integrated Circuit	(E/EG)
Q201	DTC124EF	D. Transistor	
Q202	"	"	
Q203	2SC2021Q,R,S	Transistor	
Q204	"	"	
Q205	"	"	(E/EG)
Q206	"	"	
Q207	"	"	
Q208	"	"	
D201	1SS133	Diode	(E/EG)
D202	"	"	(")
D203	"	"	(")
D204	"	"	(")
D205	"	"	(")
D206	"	"	(")
R201	QRD161J-391	CR	
R202	" -102	"	
R203	–	–	
R204	–	–	
R205	QRD161J-221	CR	
R206	" -391	"	
R207	" -122	"	
R208	" -393	"	
R209	" -472	"	
R210	QVZ3518-223	VR	
R211	QRD161J-223	CR	
R212	" -223	"	
R213	" -122	"	
R214	" -222	"	
R215	" -102	"	
R216	" -681	"	
R217	QVZ3518-331	VR	
R218	QRD161J-821	CR	
R219	" -102	"	
R220	" -272	"	
R221	" -561	"	
R222	" -473	"	
R223	" -102	"	
R224	" -332	"	(E/EG)
R225	" -154	"	(")
R226	" -563	"	(")
R227	" -182	"	(")
R228	QVZ3518-472	VR	(")
R229	QRD161J-103	CR	(")
R230	" -562	"	(")
R231	" -333	"	(")
R232	" -393	"	(")
R233	" -102	"	(")
R234	" -393	"	(")
R235	" -102	"	

Symbol No.	Part No.	Part Name	Description
R236	QRD161J-122	CR	
R237	" -471	"	
R238	" -152	"	
R239	" -223	"	
R240	" -682	"	
R241	" -102	"	
R242	" -181	"	
R243	" -391	"	
R244	" -331	"	
R245	" -822	"	(E/EG)
R246	" -393	"	(")
R247	" -102	"	
R248	" -274	"	
C201	QET61CM-106	E Cap	
C202	" -106	"	
C203	QET61HM-225	"	
C204	QFN31HJ-563	MY Cap	
C205	QFN31HK-224	"	
C206	QET61EM-335	E Cap	
C207	QCF31HP-473	C Cap	
C208	" -223	"	
C209	QET61EM-475	E Cap	
C210	QET60JM-476	"	
C211	QCF31HP-103	C Cap	
C212	QET61HM-105	E Cap	
C213	" -105	"	
C214	QFN31HK-223	MY Cap	
C215	QCT25CH-220	C Cap	
C216	QCF31HP-223	"	
C217	QET61CM-106	E Cap	
C218	QFN31HK-473	MY Cap	
C219	QCF31HP-103	C Cap	
C220	QCS31HJ-820	"	
C221	QCF31HP-223	"	(E/EG)
C222	QET61CM-476	E Cap	(")
C223	" -336	"	(")
C224	QFN31HK-182	MY Cap	(")
C225	QFN31HJ-272	"	(")
C226	QFN31HK-223	"	(")
C227	QET61CM-106	E Cap	(")
C228	QCF31HP-103	C Cap	(")
C229	" -103	"	
C230	" -103	"	(E/EG)
C231	" -102	"	
C232	QCS31HJ-6R0	"	
C233	QCF31HP-223	"	
C234	QET60JM-476	E Cap	
L201	PU47051-822	Coil	
L202	PU48530-101K	Peaking Coil	
L203	" -101K	"	
L204	" -222J	"	
L205	" -101K	"	(E/EG)

Symbol No.	Part No.	Part Name	Description
L206	PU47051-562	Coil	(E/EG)
L207	PU49057	LC Block	(")
L208	PU48530-150J	Peaking Coil	
L209	" -820J	"	
L210	" -101K	"	
LPF201	PU58022	Low Pass Filter	
LPF202	PU58705	"	
BPF201	PU54410-2	Band Pass Filter	
BPF202	PU57072	"	
CF201	PU56983	Ceramic Filter	(E/EG)
X201	PU31449-4K	Crystal	
XB201	PU58023	Crystal Block	
DL201	PU55808	2H Delay Line	
CN101	PU49215-6	Cap. Housing	
CN102	" -2	"	
CN103	" -8	"	
CN104	" -12	"	
CN105	" -10	"	
TP	PU50766	Test Pin	TP204, 210 (E/EG)
TAB 1	A74017	Tab	

Symbol No.	Part No.	Part Name	Description
— M. CTL section —			
⚠IC301	M50730-616SP	Integrated Circuit	
IC302	BA6238AU3	"	
⚠Q301	2SC3243D,E	Transistor	
⚠Q302	2SD637R,S	"	
Q303	DTA124EF	D. Transistor	
Q304	DTC144WF	"	
Q305	DTC144EF	"	
Q306	"	"	
Q307	2SB641R,S	Transistor	
Q308	DTA124EF	D. Transistor	(EK)
⚠D301	RD7.5ES-T1B2	Zener Diode	or HZS7.5EB2
D302	RD5.6ES-T1B3	"	or HZS5.6EB3
D303	—	—	
D304	RD8.2ES-T1B2	Zener Diode	or HZS8.2EB2
D305	MA165	Diode	or 1SS133
D306	"	"	or "
D307	"	"	or "
D308	"	"	or "
D309	"	"	or "
D310	"	"	or "
D311	"	"	or "
D312	"	"	or "
D313	"	"	or "
D314	MA27WA	"	
D315	RD7.5ES-T1B1	Zener Diode	
D316	RD3.0ES-T1B2	"	
D317	MA165	Diode	or 1SS133
D318	"	"	or "
R301	QRD161J-472	CR	
R302	" -103	"	
R303	" -105	"	
R304	" -222	"	
R305	" -152	"	
R306	—	—	
R307	QRD161J-472	CR	
R308	" -124	"	
R309	" -124	"	
R310	" -472	"	
R311	" -472	"	
R312	" -103	"	
R313	" -103	"	
R314	" -103	"	
R315	" -103	"	
R316	" -103	"	
R317	" -332	"	
R318	" -332	"	
R319	" -103	"	
R320	" -103	"	

Symbol No.	Part No.	Part Name	Description
R321	QRD161J-472	CR	
R322	" -103	"	
R323	" -822	"	
R324	" -123	"	
R325	" -183	"	
R326	" -103	"	
R327	" -473	"	
R328	" -103	"	
R329	" -102	"	
R330	" -472	"	
R331	" -472	"	
R332	" -472	"	
R333	" -472	"	
R334	" -472	"	
R335	" -103	"	
R336	" -103	"	
R337	" -332	"	
R338	" -472	"	
R339	" -223	"	
R340	" -473	"	
R341	" -473	"	
R342	" -103	"	
R343	" -103	"	
R344	" -272	"	
R345	" -472	"	
R346	" -103	"	
RA301	EXB-P83472M	Resistor Array	
C301	QET61EM-475	E Cap	
C302	QCS31HJ-390	C Cap	
C303	" -390	"	
C304	QCF31HP-223	"	
C305	" -223	"	
C306	QEK61CM-106	E Cap	
C307	QEB61CM-336	"	
C308	QCF31HP-473	C Cap	
C309	QET61EM-106	E Cap	
C310	QET61CM-336	"	
C311	QFN31HJ-102	MY Cap	
C312	QCF31HP-223	C Cap	
C313	" -223	"	
C314	QET61CM-106	E Cap	
C315	QCY31HK-102	C Cap	
C316	QCF31HP-223	"	
C317	QCF11HP-472	"	
CN301	PU49215-10	Cap. Housing	
CN302	" -6R	"	
CN303	" -4	"	
CN304	" -6	"	
CN305	" -5	"	
CN306	" -11	"	
CN307	" -3	"	

Symbol No.	Part No.	Part Name	Description
⚠ CF301	PU56292	Ceramic Filter	
⚠ CP301	ICP-F15	Circuit Protector	
⚠ PTH301	PU52108-2R2	Posistor	

Symbol No.	Part No.	Part Name	Description
– Servo section –			
IC401	M51795P	Integrated Circuit	
⚠ IC402	BU2710SA	"	
IC403	M5224P	"	
Q401	DTA144WF	D. Transistor	
Q402	2SD636R,S	Transistor	
Q403	"	"	
Q404	2SB641R,S	"	
Q405	2SD636R,S	"	
Q406	2SB641R,S	"	
Q407	UN4112	D. Transistor	
Q408	2SD636R,S	Transistor	
Q409	"	"	
Q410	DTA144WF	D. Transistor	
Q415	DTC124EN		
D401	MA165	Diode	or 1SS133
D402	"	"	or "
D403	"	"	or "
D404	"	"	or "
D405	RD5.1ES	Zener Diode	or HZS5.1E
D406	MA165	Diode	or 1SS133
D407	"	"	or "
D408	"	"	or "
D409	"	"	or "
R401	QRD161J-392	CR	
R402	" -564	"	
R403	" -105	"	
R404	" -103	"	
R405	" -105	"	
R406	" -104	"	
R407	" -152	"	
R408	" -102	"	
R409	" -471	"	
R410	" -474	"	
R411	" -332	"	
R412	" -104	"	
R413	" -822	"	
R414	QVZ3518-473	VR	
R415	QRD161J-103	CR	
R416	QVZ3521-104	VR	
R417	QRD161J-103	CR	
R418	" -103	"	
R419	" -105	"	
R420	QVZ3518-474	VR	
R421	QRD161J-563	CR	
R422	" -104	"	
R423	" -104	"	
R424	" -104	"	
R425	" -104	"	

Symbol No.	Part No.	Part Name	Description
R426	QRD161J-472	CR	
R427	" -561	"	
R428	" -472	"	
R429	" -102	"	
R430	" -103	"	
R431	" -332	"	
R432	" -683	"	
R433	" -105	"	
R434	" -223	"	
R435	" -472	"	
R436	" -333	"	
R437	" -105	"	
R438	" -105	"	
R439	" -105	"	
R440	" -393	"	
R441	" -823	"	
R442	" -684	"	
R443	" -474	"	
R444	" -104	"	
R445	" -103	"	
R446	" -222	"	
R447	" -103	"	
⚠ R448	PU52108-1R0	Posistor	
R449	QRD161J-394	CR	
R450	" -103	"	
R451	" -103	"	
R452	" -103	"	
R453	" -103	"	
R454	" -103	"	
R455	" -223	"	
R456	" -103	"	
C401	QFN31HJ-393	MY Cap	
C402	QET61CM-106	E Cap	
C403	QCS31HJ-101	C Cap	
C404	QEK61CM-106	E Cap	
C405	QET61CM-476	"	
C406	QCS31HJ-151	C Cap	
C407	QET61HM-474	E Cap	
C408	QET61CM-106	"	
C409	" -336	"	
C410	QFN31HJ-102	MY Cap	
C411	" -223	"	
C412	" -102	"	
C413	QEK61CM-226	E Cap	
C414	QCS31HJ-221	C Cap	
C415	QFN31HJ-103	MY Cap	
C416	" -103	"	
C417	" -223	"	
C418	" -102	"	
C419	" -102	"	
C420	QEB61CM-106	E Cap	
C421	QFN31HJ-102	MY Cap	
C422	" -102	"	
C423	" -124	"	
C424	QET61CM-476	E Cap	
C425	QFN31HJ-184	MY Cap	

Symbol No.	Part No.	Part Name	Description
C426	QEN61HM-475	NP Cap	
C427	QFN31HJ-472	MY Cap	
C428	QEN61HM-105	NP Cap	
C429	QET61CM-106	E Cap	
C430	" -106	"	
C431	QET61HM-225	"	
C432	" -225	"	
C433	QET61EM-106	"	
C434	QCS31HJ-390	C Cap	
C435	" -680	"	
C436	QFN31HJ-102	MY Cap	
C437	" -102	"	
C438	" -102	"	
C439	QCS31HJ-101	C Cap	
C440	" -101	"	
C441	QFN41HJ-102	MY Cap	
C442	QCS11HJ-221	C Cap	
C445	QER41HM-474	E Cap	
X401	PU58217-4	Crystal	
L401	PU48530-101K	Peaking Coil	
CN401	PU49215-2R	Cap. Housing	
CN402	" -2	"	
CN403	PU53587-8	"	
TP	PU50766	Test Pin	TP401, 406, 411, 421, 422, GND

Symbol No.	Part No.	Part Name	Description
– F. Slow –			
IC501	M5223P	Integrated Circuit	or LM358P, UPC358C,
IC502	IR2339	"	or LM339N, UPC339C, M5234P
IC503	UPD1514ACT-609	"	
Q501	DTC144WF	D. Transistor	
Q502	"	"	
Q503	"	"	
Q504	2SB641R,S	Transistor	
Q505	2SD636R,S	"	
Q506	DTA144WF	D. Transistor	
Q507	2SB641R,S	Transistor	
D501	MA165	Diode	or 1SS133
D502	"	"	or "
D503	"	"	or "
D504	"	"	or "
⚠D505	RD12ES-T1B2	Zener Diode	or HZS12EB2
D506	MA165	Diode	or 1SS133
D507	"	"	or "
D508	"	"	or "
D509	"	"	or "
D510	"	"	or "
D511	"	"	or "
D512	"	"	or "
D513	"	"	or "
D514	"	"	or "
D515	"	"	or "
R501	QRD161J-104	CR	
R502	" -105	"	
R503	" -104	"	
R504	" -105	"	
R505	" -103	"	
R506	" -103	"	
R507	" -103	"	
R508	" -103	"	
R509	" -105	"	
R510	" -105	"	
R511	" -103	"	
R512	" -103	"	
R513	" -103	"	
R514	" -103	"	
R515	" -394	"	
R516	" -823	"	
R517	" -274	"	
R518	" -472	"	
R519	QVZ3518-224	VR	
R520	QRD161J-104	CR	
R521	" -123	"	

Symbol No.	Part No.	Part Name	Description
R522	QRD161J-103	CR	
R523	" -103	"	
R524	" -104	"	
R525	" -124	"	
R526	" -823	"	
R527	" -224	"	
R528	" -394	"	
R529	" -333	"	
R530	" -333	"	
R531	" -104	"	
R532	" -333	"	
R533	" -333	"	
R534	" -104	"	
R535	" -394	"	
R536	" -472	"	
C501	QET61HM-474	E Cap	
C502	" -474	"	
C503	QET61CM-106	"	
C504	QFN31HJ-103	MY Cap	
C505	" -103	"	
C506	QCS31HJ-331	C Cap	
C507	QFN31HJ-154	MY Cap	
C508	" -102	"	
C509	QET61HM-474	E Cap	
C510	QFN31HJ-154	MY Cap	
C511	QET61HM-106	E Cap	
C512	QCS31HJ-680	C Cap	
C513	" -680	"	
C514	QET61CM-106	E Cap	
C515	QFN31HJ-104	MY Cap	
C516	" -104	"	
C517	" -103	"	
L501	PU48530-101K	Peaking Coil	
CF501	PU55812	C. Resonator	
CN501	PU49215-4R	Cap. Housing	
TAB 5	A74017	Tab	
SPA 5	PU57215-2	Spacer	
MCL 5	PU55379-2	Mini Clamp	

6.2.3 Terminal board ass'y $\boxed{0}\boxed{3}$ .... PU35831B-2 (E) PU35831C-2 (EG) PU35831D (EK)

Symbol No.	Part No.	Part Name	Description
IC 1	TC4066BP	Integrated Circuit	
IC 2	TA7348P	″	
Q 1	DTC124EF	D. Transistor	
Q 2	2SB643R	Transistor	
Q 3	2SC2021Q,R	″	
Q 4	DTC124EF	D. Transistor	
D 1	MA165TA	Diode	or 1SS133
D 2	″	″	or ″
D 3	″	″	or ″
D 4	″	″	or ″
D 5	″	″	or ″
D 6	″	″	or ″
D 7	″	″	or ″
D 8	″	″	or ″
D 9	″	″	or ″
D10	″	″	or ″
D11	″	″	or ″
D12	″	″	or ″
D13	″	″	or ″
D14	″	″	or ″
D15	″	″	or ″
D16	″	″	or ″
⚠D17	″	″	or ″
⚠D18	″	″	or ″
R 1	QRD161J-104	CR	
R 2	″ -104	″	
R 3	″ -153	″	
R 4	″ -104	″	
R 5	″ -104	″	
R 6	″ -101	″	
R 7	″ -473	″	
R 8	″ -103	″	
R 9	″ -103	″	
R10	″ -103	″	
R11	″ -473	″	
R12	″ -473	″	
R13	″ -104	″	
R14	″ -104	″	
R15	″ -104	″	
R16	″ -750	″	
R17	″ -221	″	
R18	″ -473	″	
R19	″ -102	″	
R20	″ -103	″	
R21	″ -392	″	
R22	″ -102	″	
R23	″ -103	″	
R24	″ -392	″	
R25	″ -102	″	
R26	″ -562	″	
R27	″ -680	″	
R28	″ -562	″	
R29	″ -473	″	
R30	″ -122	″	
R31	QRD161J-122	CR	
R32	–	–	
R33	QRD161J-222	CR	
⚠R34	″ -222	″	
⚠R35	″ -222	″	
⚠R36	″ -561	″	
C 1	QEK61EM-475	E Cap	
C 2	″ -475	″	
C 3	″ -475	″	
C 4	″ -475	″	
C 5	″ -475	″	
C 6	QEK60JM-476	″	
C 7	QEK61EM-475	″	
C 8	QEK61CM-476	″	
C 9	QCF31HP-223	C Cap	
C10	QEK61AM-336	E Cap	
C11	″ -336	″	
C12	QEP61AM-336	″	
C13	QEK61AM-336	″	
C14	QCS31HJ-220	C Cap	
CONN	PU55851	Camera Connector	
SCR	SSSP3010M	Screw	
L 1	PU48530-101K	Peaking Coil	

6.2.4 Tuner/IF board ass'y 0 4

PU22043CA-4 (E)
PU22043JA-4 (EG)
. . . PU22043BA-4 (EK)

Symbol No.	Part No.	Part Name	Description
IC 1	M51316BP	Integrated Circuit	
IC 2	M5223P	"	
IC 3	M5224P	"	
⚠IC 4	M50161-391SP	"	
IC 5	M58653P	"	
Q 1	2SC2636S,T	Transistor	
Q 2	2SA1254B	"	or 2SA1254C
Q 3	2SD638R,S	"	
⚠Q 4	2SB644R,S	"	
Q 5	2SD637R	"	
Q 6	"	"	
Q 7	"	"	
Q 8	2SD1330S,T	"	
Q 9	–	–	
Q10	–	–	
Q11	–	–	
Q12	2SD637R,S	Transistor	
Q13	2SC3327A	"	or 2SC2878A
Q14	DTC144EF	D. Transistor	
Q15	"	"	(E/EG)
Q16	2SB810HJ	Transistor	(")
Q17	DTC144EF	D. Transistor	(")
Q18	2SB810HJ	Transistor	(")
Q19	DTC144EF	D. Transistor	(")
Q20	–	–	
Q21	2SB810H,J	Transistor	(E/EG)
Q22	DTC144EF	D. Transistor	
Q23	2SB641Q,R	Transistor	
Q24	2SD637Q,R,S	"	
⚠Q25	2SD637R,S	"	
Q26	DTC144EF	D. Transistor	
Q27	2SB644R,S	Transistor	
D 1	RD6.8ES-T1B2	Zener Diode	
D 2	1SS133	Diode	
D 3	"	"	
D 4	1SV68	"	(E/EG)
D 5	1SS133	"	
D 6	LTZ-R15	"	or LTZ-MR15
D 7	LTZ33-02	"	or UPC574J-KL
D 8	1SS133	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	"	"	
D13	RD7.5EB2	Zener Diode	or HZ7C1
⚠D14	RD5.6EB3	"	or HZ6B3
D15	1SS133	Diode	

Symbol No.	Part No.	Part Name	Description
R 1	QRD161J-750	CR	(EK)
R 2	" -103	"	
R 3	" -152	"	
R 4	" -470	"	
R 5	" -681	"	
R 6	" -101	"	(E/EG)
	" -470	"	(EK)
R 7	–	–	
R 8	QRD161J-222	CR	
R 9	" -331	"	
R10	QVZ3518-472	VR	
R11	QRD161J-102	CR	
R12	" -153	"	
R13	" -823	"	
R14	" -332	"	
R15	QRD182J-100	"	
R16	QRD161J-471	"	
R17	" -331	"	
R18	" -681	"	(E/EG)
	" -471	"	(EK)
R19	" -471	"	(E/EG)
	" -331	"	(EK)
R20	" -101	"	
R21	" -473	"	
R22	" -332	"	
R23	" -331	"	
R24	" -104	"	
R25	" -102	"	
R26	" -223	"	
R27	" -273	"	
R28	" -222	"	
R29	" -122	"	
R30	" -104	"	
R31	" -822	"	
R32	QVZ3518-332	VR	
R33	QRD161J-104	CR	(E/EG)
R34	–	–	
R35	QRD161J-471	CR	
R36	–	–	
R37	QRD161J-331	CR	
R38	–	–	
R39	–	–	
R40	QVZ3518-103	VR	
R41	QRD161J-472	CR	
R42	" -103	"	
R43	" -122	"	
R44	" -472	"	(E/EG)
R45	" -332	"	
R46	" -472	"	(E/EG)
R47	" -102	"	
R48	" -472	"	(E/EG)
R49	" -474	"	
R50	–	–	
R51	QRD161J-104	CR	
R52	" -103	"	
R53	–	–	
R54	–	–	
R55	QRD161J-334	CR	
R56	" -103	"	
R57	" -471	"	
R58	" -103	"	
R59	" -103	"	
R60	–	–	
R61	QRD161J-223	CR	
R62	" -222	"	
R63	" -473	"	
R64	" -473	"	
R65	" -103	"	

Symbol No.	Part No.	Part Name	Description
R66	QRD161J-331	CR	
R67	–	–	
R68	QRD161J-222	CR	
R69	" -331	"	
R70	–	–	
R71	QRD161J-103	CR	
R72	" -103	"	
R73	" -333	"	
R74	" -394	"	
R75	" -154	"	
R76	" -154	"	
R77	" -154	"	
R78	" -333	"	
R79	" -333	"	
R80	–	–	
R81	QRD161J-223	CR	
R82	" -183	"	
R83	" -104	"	
R84	" -103	"	
R85	" -333	"	
R86	" -104	"	
R87	" -104	"	
R88	" -332	"	(E/EG)
R89	" -332	"	(")
R90	" -332	"	(")
R91	" -562	"	
R92	" -472	"	
R93	" -224	"	
R94	" -124	"	
R95	" -105	"	
R96	" -392	"	
R97	" -472	"	
R98	" -562	"	
R99	" -472	"	
R100	–	–	
R101	QRD161J-105	CR	
R102	" -392	"	
R103	" -224	"	
R104	" -123	"	
R105	" -683	"	
R106	" -224	"	
R107	" -105	"	
R108	" -333	"	(E/EG)
R109	" -273	"	(")
R110	–	–	
R111	QRD161J-154	CR	(E/EG)
R112	" -154	"	(")
R113	" -154	"	(")
R114	" -222	"	
R115	" -103	"	
R116	" -103	"	
R117	" -103	"	
R118	" -103	"	
R119	" -103	"	
⚠R120	" -101	"	
R121	–	–	
R122	–	–	
R123	QRD161J-473	CR	
R124	" -151	"	
⚠R125	" -181	"	
R126	" -332	"	
R127	" -473	"	
R128	" -153	"	(E/EG)
R129	" -153	"	(")
R130	" -153	"	(")

Symbol No.	Part No.	Part Name	Description
R131	–	–	
R132	QRD161J-472	CR	
R133	" -472	"	
R134	" -472	"	
R135	" -472	"	
R136	" -104	"	
R137	" -332	"	
C 1	QCF31HP-102	C Cap	
C 2	" -222	"	
C 3	" -102	"	(E/EG)
C 4	" -222	"	
C 5	QET61CM-106	E Cap	
C 6	QET61EM-475	"	
C 7	QFN31HK-473	MY Cap	
C 8	QCF31HP-222	C Cap	
C 9	QET61CM-106	E Cap	
C10	QFN31HK-473	MY Cap	
C11	QCF31HP-222	C Cap	
C12	" -222	"	
C13	" -222	"	
C14	" -222	"	
C15	" -223	"	
C16	QET61CM-336	E Cap	
C17	QCS31HJ-470	C Cap	
C18	QCF31HP-223	"	
C19	QFN31HK-102	MY Cap	
C20	QET61HM-105	E Cap	
C21	–	–	
C22	–	–	
C23	QCF31HP-102	C Cap	
C24	QCT25SH-390	"	(E/EG)
	QCT25LH-560	"	(EK)
C25	QCT25CH-120	"	(E/EG)
	" -180	"	(EK)
C26	–	–	
C27	QET61CM-106	E Cap	
C28	QCF31HP-222	C Cap	
C29	QET61CM-336	E Cap	
C30	" -106	"	
C31	QCS31HJ-180	C Cap	
C32	–	–	
C33	QCT25HH-680	C Cap	(E/EG)
	" -151	"	(EK)
C34	QCT25CH-6R0	"	(E/EG)
	" -150	"	(EK)
C35	QCT25RH-220	"	(E/EG)
C36	QCF31HP-223	"	
C37	–	–	
C38	–	–	
C39	–	–	
C40	–	–	
C41	QET61CM-106	E Cap	(E/EG)
C42	QET61HM-106	"	
C43	QFN41HJ-562	MY Cap	
C44	QET61CM-106	E Cap	(E/EG)
C45	QET61HM-105	"	

Symbol No.	Part No.	Part Name	Description
C46	QFN31HJ-182	MY Cap	
C47	QET61CM-106	E Cap	(E/EG)
C48	QET61EM-335	"	
C49	QET61CM-107	"	
C50	–	–	
C51	QFN31HK-104	MY Cap	
C52	QET61CM-106	E Cap	
C53	" -106	"	
C54	QFN31HK-223	MY Cap	
C55	" -223	"	
C56	–	–	
C57	QET61EM-475	E Cap	
C58	–	–	
C59	–	–	
C60	QCF31HP-102	C Cap	
C61	QFN31HK-333	MY Cap	
C62	" -153	"	
C63	" -333	"	
C64	" -153	"	
C65	QET61HM-105	E Cap	
C66	QFN31HK-333	MY Cap	(E/EG)
C67	" -153	"	(")
C68	" -333	"	(")
C69	QET61HM-474	E Cap	(")
C70	QET61CM-336	"	
C71	" -336	"	
C72	" -336	"	
C73	QET60JM-476	"	
C74	QCS31HJ-101	C Cap	
C75	QET61HM-106	E Cap	
C76	QCS31HJ-330	C Cap	
C77	" -330	"	
C78	QCF31HP-103	"	
C79	–	–	
C80	QCF31HP-223	C Cap	
L 1	PU57717-1R0	Peaking Coil	
L 2	–	–	
L 3	PU48530-6R8J	Peaking Coil	
L 4	PU57717-1R5	"	
L 5	PU48530-100J	"	
L 6	" -120J	"	
L 7	" -470J	"	
L 8	" -271J	"	
SAW 1	PU34218	Saw Filter	(E/EG)
	PU32987-11	"	(EK)
CF 1	PU57902-2	Ceramic Filter	(E/EG)
	" -3	"	(EK)
CF 2	PU57707-2	"	(E/EG)
	PU57707	"	(EK)
CF 3	PU32990-2	"	(E/EG)
	" -3	"	(EK)
CF 4	–	–	
⚠CF 5	PU55812	C. Resonator	

Symbol No.	Part No.	Part Name	Description
T 1	PU55267	I.F.T.	(E/EG)
	" -4	"	(EK)
T 2	PU55268	"	
T 3	PU58063	"	
T 4	PU51467	"	
T 5	PU57228	Coil	(E/EG)
CN 1	PU49215-7	Cap. Housing	
CN 2	" -5	"	
CN 3	" -4	"	
RA 1	EXB-P84224M	Resistor Array	
RA 2	EXB-P85103M	"	
⚠TNR 1	PU34219-8-2	Tuner	(E/EG) or PU34219-8-3
⚠	PU34220		(EK)
SHL 1	PU35606-1-2	Shield Case (1)	(E/EG)
SHL 2	PU35608-1-2	Shield Plate (1)	
SHL 3	PU35609-1-2	Shield Case (2)	
SHL 4	PU35611-1-2	Shield Plate (2)	
SHL 5	PU35607-1-2	Shield Cover (1)	(EG)
SHL 6	PU35647	" Plate (3)	(")

6.2.5 Head/MDA board ass'y 0 8 . . . . PU35744A-1

Symbol No.	Part No.	Part Name	Description
IC 1	AN6671K	Integrated Circuit	
Q 1	2SB1052	Transistor	or 2SB941P,Q
D 1	RD5.1ES-T1B	Zener Diode	or HZS5.1EBTJ
R 1	QRD161J-562	CR	
R 2	" -123	"	
R 3	" -562	"	
R 4	" -222	"	
R 5	" -223	"	
R 6	" -223	"	
R 7	" -103	"	
R 8	" -222	"	
R 9	" -123	"	
R10	" -151	"	
R11	" -151	"	
R12	" -471	"	
R13	" -561	"	
R14	" -391	"	
R15	" -333	"	
R16	" -562	"	
R17	" -223	"	
R18	" -222	"	
R19	" -222	"	
R20	QRX016J-R68	OMR	or QRX019J-R68
R21	QRD161J-222	CR	
C 1	QFN31HK-473	MY Cap	
C 2	" -333	"	
C 3	" -473	"	
C 4	QET61HM-225	E Cap	
C 5	" -225	"	
C 6	QEK61HM-225	"	
C 7	QET61HM-225	"	
C 8	QFN31HK-152	MY Cap	
C 9	QFZ9011-104	"	or QFJ41HK-104
C10	QFN31HK-104	"	
C11	" -104	"	
C12	QET61EM-106	E Cap	
CN 1	PU57593-10	Connector Wafer Ass'y	
CN 2	PU49215-108	Cap. Housing	
CN 3	" -110	"	

6.2.6 RF converter & MIX booster 1 0

Symbol No.	Part No.	Part Name	Description
⚠ RF 1	PU58024M-01	RF CONV. & MIXER	(E/EG)
⚠ RF 2	PU58053S	RF CONV.	(EK)

6.2.7 Audio/Control head board 1 2

Symbol No.	Part No.	Part Name	Description
	PU58016	A/C Head Board	
CN 1	PU54537-5	Cap. Housing	
CN 2	" -2	"	
BKT 1	PQ41646	Bracket	
SCR 1	SPSH1740	Mini Screw	

6.2.8 End sensor board 1 3

Symbol No.	Part No.	Part Name	Description
	PU55111	End Sensor Board	
Q 1	PT-352V	Photo Transistor	or PN202SR
C 1	QCF11HP-103	C Cap	

6.2.9 Mode (loading) sensor board ass'y 1 4 . . . . PU35632A3

Symbol No.	Part No.	Part Name	Description
PS 1	PU57650-1-1	Photo Sensor	
R 1	QRD161J-561Y	CR	

6.2.10 Cassette LED board 1 5

Symbol No.	Part No.	Part Name	Description
	PU58017	LED Board	
D 1	GL-450V	LED	
HD1	PQ30242-1-1	LED Holder	

6.2.11 Heat sinc 1 7 .... PU35631A

Symbol No.	Part No.	Part Name	Description
CN 1	PU49215-103	Cap Housing	
Q 1	2SD1128-08	Transistor	
C 1	QCS31HP-103	C Cap	
SCR	DPSP3008Z	Screw	
HET 1	PU58033	Heat Sinc	

6.2.12 Cassette housing board 1 8

Symbol No.	Part No.	Part Name	Description
	PU56460-1-2	Cassette Housing Board	
Q 1	PT-352V	Photo Transistor	
C 1	QCF11HP-103	C Cap	
C 2	" -223	"	
C 3	" -223	"	
C 4	" -103	"	
CN 1	PU49215-109	Cap. Housing	

6.2.13 Deck terminal board ass'y 2 0 . . . . PU35632B

Symbol No.	Part No.	Part Name	Description
Q 1	2SD636Q,R,S	Transistor	
D 1	1SS133	Diode	
D 2	–	–	
D 3	HZS5.6EB1	Zener Diode	
R 1	QRD161J-561	CR	
R 2	" -221	"	
R 3	" -181	"	
R 4	" -822	"	
R 5	" -152	"	
R 6	" -272	"	
R 7	–	–	
R 8	–	–	
R 9	–	–	
R10	QRD161J-102	CR	
R11	" -272	"	
PS 1	GP2L04BD	Photo Sensor	
CN 1	PU43351-11	Cap. Housing	
CN 2	PU49215-2	"	
CN 3	PU51260-10	"	
CN 4	–	–	
CN 5	PU43351-4	Cap. Housing	
SCR	SPST3008Z	Screw	
SCR	DPSP3010Z	"	
SCR	SDSP2608Z	"	

6.2.14 TU reel sensor board ass'y 2 2 . . . PU35632A2

Symbol No.	Part No.	Part Name	Description
PS1	GP2L04B	Photo Sensor	
D 1	HZS5.6EB1	Zener Diode	
HD1	PQ41391	Sensor Holder	

6.2.15 P. TR board ass'y 2 4 .... PU58508A

Symbol No.	Part No.	Part Name	Description
Q 1	2SD1406Y,GR	Transistor	or 2SD1567K
HTS 1	PU57998	Heat Sink	
HD 1	PU35596	PWB Holder	
SCR 1	LPSP3008Z	Screw	for TR
SCR 2	DPSP3008Z	"	for H.S

6.2.16 Mode (control) motor board 3 0

Symbol No.	Part No.	Part Name	Description
	PU57725-1-2	Motor Board	
C 1	QEN61HM-105	NP Cap	
C 2	QCF11HP-223	C Cap	
C 3	" -223	"	
CN 1	PU49215-102	Cap. Housing	
LUG 1	PQ41430	Earth Lug	

6.2.17 Power switch board ass'y [3] [1] PU11275A2

Symbol No.	Part No.	Part Name	Description
D 1	SLP-981C-50	L.E.D.	
D 2	–	–	
D 3	MA165	Diode	or 1SS133
D 4	–	–	
D 5	MA165	Diode	or 1SS133
R 1	QRD161J-331	CR	
R 2	–	–	
R 3	–	–	
R 4	QRD161J-104	CR	
R 5	〃 -152	〃	
R 6	〃 -223	〃	
R 7	–	–	
R 8	QRD161J-103	CR	
R 9	–	–	
R10	QRD161J-120	CR	
C 1	QCY31HK-471	C Cap	
C 2	QEK61EM-475	E Cap	
C 3	QFJ41HK-273	MY Cap	
C 4	QEK60JM-476	E Cap	
C 5	–	–	
C 6	QEK60JM-476	E Cap	
S 1	PU57550	Tact Switch	
	PU58005A	IFR Board Ass'y	

6.2.18 Display board ass'y [3] [2] . . . PU11275A1 (EG) PU11275B1 (E/EK)

Symbol No.	Part No.	Part Name	Description
⚠IC301	MN1250BJC	Integrated Circuit	
R301	QRD161J-153	CR	
R302	〃 -103	〃	
R303	〃 -105	〃	
R304	〃 -105	〃	
R305	〃 -103	〃	
R306	〃 -104	〃	
C301	QCS31HJ-470	C Cap	
C302	QEK61HM-475	E Cap	
CN 1	PU51260-11	Cap. Housing	
CN 2	〃 -10	〃	
CN 3	〃 -9	〃	
FDP	PU57989	FDP	(E/EK)
FDP	〃 -2	FDP	(EG)
	PU57923-1-2	D. Holder	for FDP
WCL 1	PU56729	Wire Clamp	

6.2.19 Operation board ass'y [3] [3] . . PU11269A2-1 (E/EG) PU11269B2-1 (EK)

Symbol No.	Part No.	Part Name	Description
⚠IC101	M50115AP	Integrated Circuit	
R101	QRD181J-152	CR	
R201	PU57948	VR	SHARPNESS
R202	PU58581	〃	TRACKING
R203	PU58374	〃	SUB
C101	QCS31HJ-221	C Cap	
C102	〃 -221	〃	
CF101	PU49487	Ceramic Filter	
S101	PU57551	Tact Switch	STOP
S102	〃	〃	REC
S103	〃	〃	FF
S104	〃	〃	REW
S105	〃	〃	PAUSE
S106	〃	〃	PLAY
S107	〃	〃	EJECT
S108	〃	〃	SLOW –
S109	〃	〃	SLOW +
S201	PU57957	Slide Switch	INPUT SEL.
S202	PU57551	Tact Switch	OTR
S203	PU57550	〃	CANCEL
S204	PU57551	〃	DISCR. MODE
S205	PU57550	〃	BACK
S206	PU57551	〃	RESET
S207	PU57550	〃	NEXT
S208	〃	〃	0
S209	〃	〃	1
S210	〃	〃	2
S211	〃	〃	3
S212	〃	〃	4
S213	〃	〃	5
S214	〃	〃	6
S215	〃	〃	7
S216	〃	〃	8
S217	〃	〃	9
S218	〃	〃	PROG. NO.
S219	〃	〃	CLK. ADJ.
S220	PU52621	Push Switch	TIMER
S221	〃	〃	MEMORY
S301	PU57551	Tact Switch	CH UP
S302	〃	〃	CH DOWN
SUP 1	PU55353	Supporter	
J 1	PU58753-13	Flat Wire	
J 2	〃 -12	〃	(E/EG)
	〃 -04	〃	(EK)
J 3	PU58062	〃	

6.2.20 Timer board ass'y 3 4 .... PU11269A1

Symbol No.	Part No.	Part Name	Description
⚠IC401	UPD7519H-023-36	Integrated Circuit	
IC402	TL066CP	"	
Q401	2SD638R,S	Transistor	
Q402	2SD636R,S	"	
D201	MA161	Diode	
D202	"	"	
D203	"	"	
D204	"	"	
D205	"	"	
D206	"	"	
D303	RD10ES-T1B	Zener Diode	or HZS10ETJ
D401	MA27WA	Diode	
D402	RD5.1ES-T1B3	Zener Diode	or HZS5.6EB1TJ
D403	11E2	Diode	
⚠D404	"	"	
D405	MA150	"	
D406	"	"	
D407	"	"	
D408	M161	"	(EK)
D411	"	"	(")
D412	RD9.1ES-T1B2	Zener Diode	or RD9.1EB2
⚠D413	RD8.2EB2	"	
D501	MA161	Diode	
D502	"	"	
D601	MA161	Diode	
R307	QRD181J-102	CR	
R308	" -102	"	
R401	QRD181J-222	CR	
R402	" -151	"	
R403	" -472	"	
R404	–	–	
R405	QRD181J-682	CR	
R406	" -104	"	
R407	" -333	"	
R408	" -394	"	
R409	" -474	"	
R410	" -684	"	
R411	" -333	"	
R412	" -564	"	
R413	" -224	"	
R414	" -273	"	
R415	" -472	"	
R416	" -103	"	
R417	" -103	"	
R418	" -103	"	
R419	" -103	"	
R420	" -103	"	
R421	" -103	"	
R422	" -103	"	
R423	QRD181J-103	CR	
R424	" -103	"	
R425	" -103	"	
R426	" -103	"	
R427	" -103	"	
R428	" -103	"	
R429	" -103	"	
R430	" -103	"	
R431	" -103	"	
R432	" -103	"	
R433	" -103	"	
R434	" -102	"	
R435	" -102	"	
R436	" -103	"	
R437	" -103	"	
R438	" -103	"	
R439	" -103	"	
R440	–	–	
⚠R441	QRD181J-121	CR	
R442	–	–	
R443	QRD181J-471	CR	
C303	QET61HM-225	E Cap	
C304	" -225	"	
C401	QET41HM-225	E Cap	
C402	PU56230-564	"	
C403	QCF31HP-223	C Cap	
C404	QET61HM-225	E Cap	
C405	–	–	
C406	QEK61HM-224	E Cap	
C407	QET61HM-475	"	
C408	QCF31HP-223	C Cap	
C409	QAT3001-011	TR Cap	
C410	QCS31HJ-5R0	C Cap	
C411	–	–	
C412	QEK41AM-107	E Cap	
⚠C413	QCF11HP-473	C Cap	
C414	" -223	"	
CN 1	PU49215-5R	Cap Housing	
CN 2	" -10	"	
CN 3	" -7	"	
CN 4	" -8	"	
CN 9	PU49215-2	Cap Housing	
TP	PU45908-3	Test Pin	TP401,402,404
RA401	EXB-P84224M	Resistor Array	
RA402	EXB-P84104M	"	
RA403	EXB-P84224M	"	
⚠X401	PU58076	Crystal	

6.2.21 Preset board ass'y $\boxed{3}\boxed{5}$ ..... PU35618A (E/EG)
PU35618B (EK)

Symbol No.	Part No.	Part Name	Description
S501	PU52621	Push Switch	BT/AFC (E)
S502	PU57550	Tact Switch	SKIP
S503	"	"	SEARCH
S504	"	"	STORE
S505	"	"	CH SET
S506	"	"	FINE +
S507	"	"	FINE –
CN 1	PU49215-7	Cap. Housing	

6.2.22 P. TR board $\boxed{3}\boxed{6}$ PU35662A

Symbol No.	Part No.	Part Name	Description
Q 1	–	–	
Q 2	2SD1266PQ	Transisotr	
Q 3	–	–	
Q 4	–	–	
Q 5	2SD1128-08	Transistor	
Q 6	–	–	
Q 7	2SD1128-08	Transistor	
	PQ30744-1-4	Heat Sinc	
SCR 1	SPSP3008Z	Screw	
SCR 2	DPSP3008Z	"	
SPA 1	PU45375	TR Spacer	
WAS 1	PU41624-6	Isolate. Washer	
CN 1	PU49215-9	Cap. Housing	

6.2.23 Remote control board ass'y $\boxed{4}\boxed{0}$

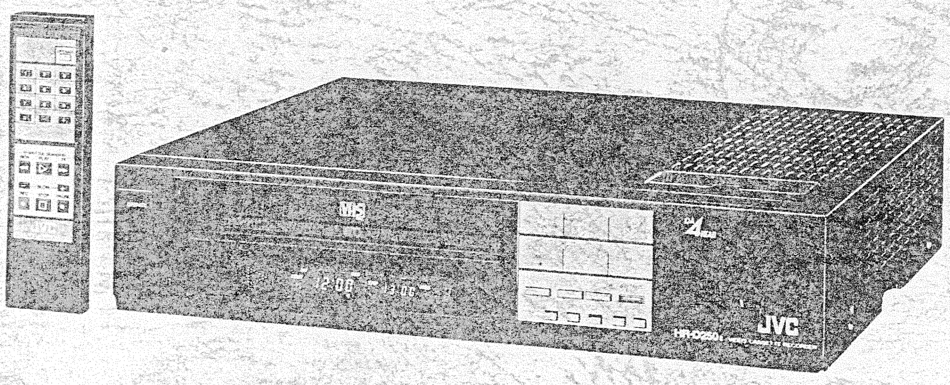
Symbol No.	Part No.	Part Name	Description
IC 1	M50115AP	Integrared Circuit	
X1(Q1)	2SD636Q,R,S	Transistor	
X2(Q2)	"	"	
X3(Q3)	2SB822Q,R	"	
D 1	MA154WA	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	MA165	"	
D12	SE303A	LED	
D13	"	"	
R 1	QRD181J-104	CR	100 K 1/8 W
R 2	" -474	"	470 K "
R 3	–	–	
R 4	QRD181J-222	CR	2.2 K 1/8 W
R 5	" -470	"	47 "
R 6	" -1R2	"	1.2 "
R 7	" -471	"	470 "
R 8	" -1R2	"	1.2 "
C 1	QCF11HP-101	C Cap	100 pF 50 V
C 2	" -101	"	100 pF "
C 3	QET40JM-107	E Cap	100 6.3 V
CF 1	CSB455E1	Ceramic Filter	
	–	Battery Terminal	

JVC

SERVICE MANUAL

FARB-VIDEO-KASSETTEN-REKORDER VHS

HR-D250EG EINSTELLANWEISUNG



TECHNISCHE DATEN

Format : VHS PAL
Aufnahmesystem : Rotierendes Zweikopfsystem, Schrägspurabtastung mit im Winkel versetzten Köpfen
Videosignalsystem : PAL-Farb- und CCIR-Monochromsignale, 625 Linien
Bandbreite : 12,65 mm
Spielzeit : 240 Min. mit E-240 Videokassette
Temperatur
  Betrieb : 5°C bis 40°C
  Lagerung : -20°C bis 60°C
Frequenzbänder : VHF BAND I, 47 – 111 MHz
  VHF BAND III, 111 – 300 MHz
  UHF BAND IV/V, 470 – 862 MHz
Antennenausgang : UHF-Kanäle 32 – 40 (einstellbar)
Leistungsaufnahme : 30 Watt (50 Watt mit Kamera)
Spannungsversorgung : 220 V∿, 50/60 Hz
Video
  Eingang : 0,5 bis 2,0 Vs-s, 75 Ohm, unsymmetrisch
  Ausgang : 1,0 Vs-s, 75 Ohm, unsymmetrisch
  Störspannungsabstand: 43 dB (Rohde & Schwarz Störspannungsmesser) bei Mittenposition des BILDSCHÄRFE-Reglers
  Horizontale Auflösung : Mehr als 250 Linien bei Mittenposition des BILDSCHÄRFE-Reglers
Audio
  Eingang : Line: -20 dBs
  50 kOhm, unsymmetrisch
  Ausgangspegel : -6 dBs, hochohmig
  Ausgangsimpedanz : Weniger als 1 kOhm, unsymmetrisch
  Störspannungsabstand: Mehr als 40 dB
  Frequenzbereich : 70 bis 10.000 Hz
Schaltuhr : 14-Tage/4-Programme
Abmessungen : 435(B) x 95(H) x 376(T) mm
Gewicht : 7,6 kg
Mitgeliefertes Zubehör : Antennenkabel, Videokassette, Infrarot-Fernbedienung, "R6" Batterie x 2

Technische Änderungen vorbehalten!

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No. 8409VD
OCTOBER 1985

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ABSCHNITT 2
EINSTELLUNG DER MECHANIK

2-1 ALLGEMEINE HINWEISE

2. 1. 1 Vorsichtsmaßnahmen

- ACHTUNG

1. Das Gerät vor dem Ausbauen oder Entlöten von Bauteilen vom Netz trennen.
2. Die Mechanik des Bandtransportsystems wurde im Werk präzise eingestellt, daher sind im Normalfall keine Nachjustierungen mehr erforderlich.
3. Schrauben vorsichtig anziehen, um Beschädigungen am Chassis und Gehäuse zu vermeiden.

2. 1. 2 Erforderliche Einstellehren, Werkzeuge und Meßgeräte

Für eine korrekte Einstellung der Mechanik sind die nachfolgend aufgeführten Einstellehren, Werkzeuge und Meßgeräte unbedingt erforderlich. Einstellarbeiten ohne diese Hilfsmittel mittels Annäherungsverfahren können zu Beschädigungen führen. Zusätzlich werden allgemein gebräuchliche Werkzeuge und ein 5,5 mm Steckschlüssel benötigt.

Erforderliche Meßgeräte :
Farbfernsehgerät oder Monitor
Oszillograf : Zweikanaloszillograf mit verzögerter Zeitbasis Bandbreite $\geqq 20$ MHz
Aufnahmeband
Abgleichbänder

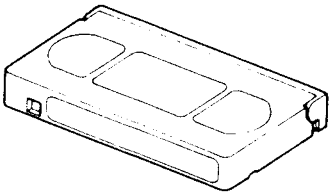
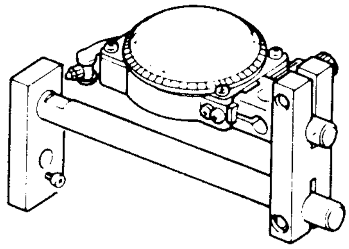
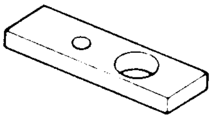
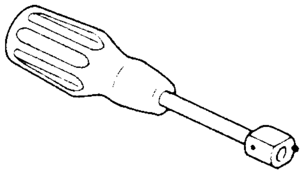
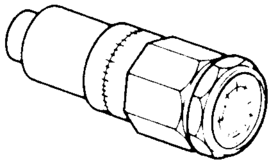
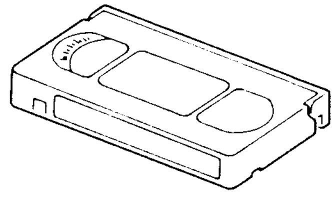
Abgleichband MH-2 	Zentrierlehre PUJ49712-2 	Distanzstück PUJ44905 (für Zentrierlehre) 
Audio/Synchronkopf-Ausrichtwerkzeug PUJ47351-2 	Drehmomentmeßuhr PUJ48075-2 (komplett) (Drehmomentmesser: 600ATG Meßuhrkopf: PUJ48016-2) 	Bandzug-Meßcassette PUJ48076 

Tabelle 2-1-1 Wekzeuge, Einstellehren und Meßgeräte

2. 1. 3 Ausbauhinweise

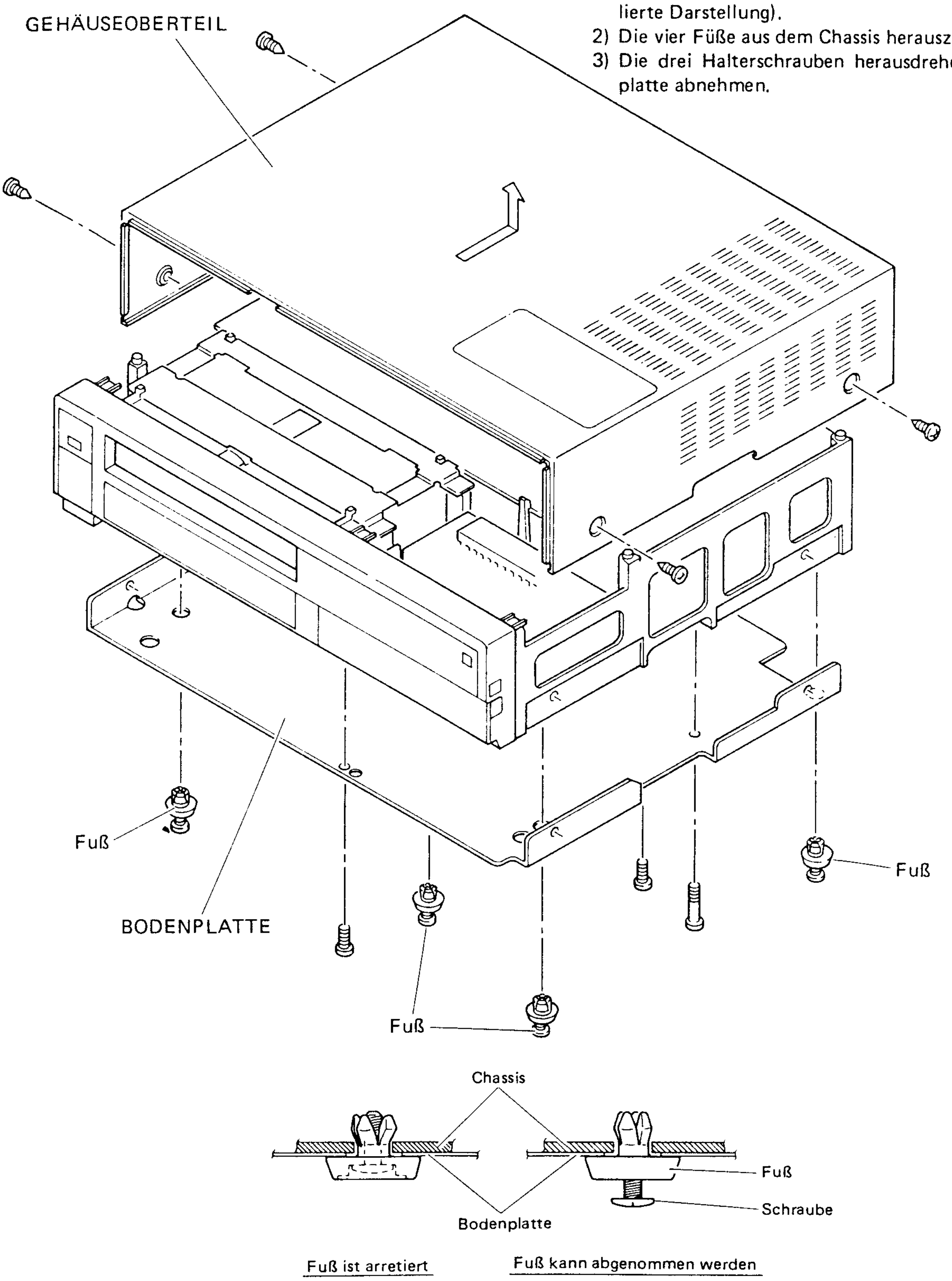
1. Gehäuseoberteil und Bodenplatte

— Gehäuseoberseite —

1) Die vier Schrauben herausdrehen und dann das Gehäuseoberteil in Pfeilrichtung abheben.

— Bodenplatte —

1) Nach dem Abnehmen des Gehäuseoberteils die vier Schrauben zum Abnehmen der Füße lösen (siehe detaillierte Darstellung).
2) Die vier Füße aus dem Chassis herausziehen.
3) Die drei Halterschrauben herausdrehen und die Bodenplatte abnehmen.


GEHÄUSEOBERTEIL
Fuß
BODENPLATTE
Fuß
Fuß
Fuß
Chassis
Fuß
Schraube
Bodenplatte

Fuß ist arretiert

Fuß kann abgenommen werden

Abb. 2-1-1 Gehäuseoberteil/Bodenplatte

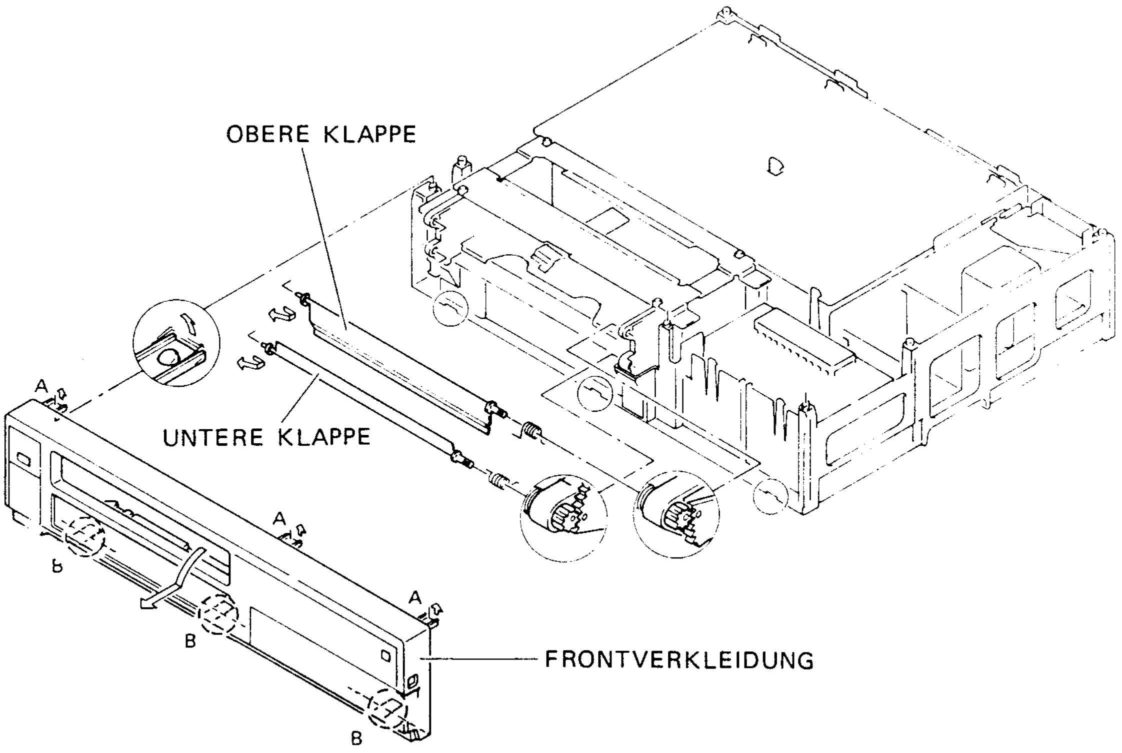
2. Frontverkleidung und Cassettenfachklappen

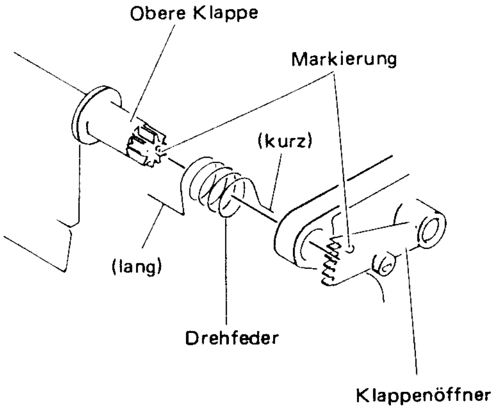
— Frontverkleidung —

1) Nach Abnehmen des Gehäuseoberteils die drei mit A markierten Zungen nach oben drücken, um sie vom Chassis zu lösen. Dann die Frontverkleidung nach außen ziehen.
2) Die drei mit B bezeichneten Laschen vom Chassis lösen und die Frontverkleidung abnehmen.

— Cassettenfachklappen —

1) Die untere Klappe bis zum Anschlag nach rechts schieben und dann deren linkes Ende aus seiner Halterung am Cassettenfach ziehen.
2) Die untere Klappe nach links abziehen. Dabei auf die Drehfeder achten.
3) Die obere Klappe wird auf die gleiche Weise wie die untere ausgebaut.





Hinweise:

Das Wiedereinsetzen der Cassettenfachklappen ist folgendermaßen durchzuführen:

1) Auf die Markierung am gezahnten Teil der oberen Klappe achten.
2) Die Drehfeder so aufsetzen, daß der lange gerade Teil der Feder auf die obere Klappe weist.
3) Die obere Klappe so einsetzen, daß die unter 1) erwähnte Markierung mit der Markierung auf dem Öffner zur Deckung kommt.
4) Die untere Klappe wird dann auf die gleiche Weise wie die obere Klappe installiert.

Abb. 2-1-2 Frontverkleidung/Cassettenfachklappen

2.2 REGELMÄSSIGE WARTUNGSARBEITEN

Zur Gewährleistung der optimalen Leistung und Zuverlässigkeit dieses Videorekorders sollten die nachfolgend beschriebenen Wartungsvorgänge regelmäßig durchgeführt werden.

2.2.1 Lage der zu wartenden Teile

1. Draufsicht

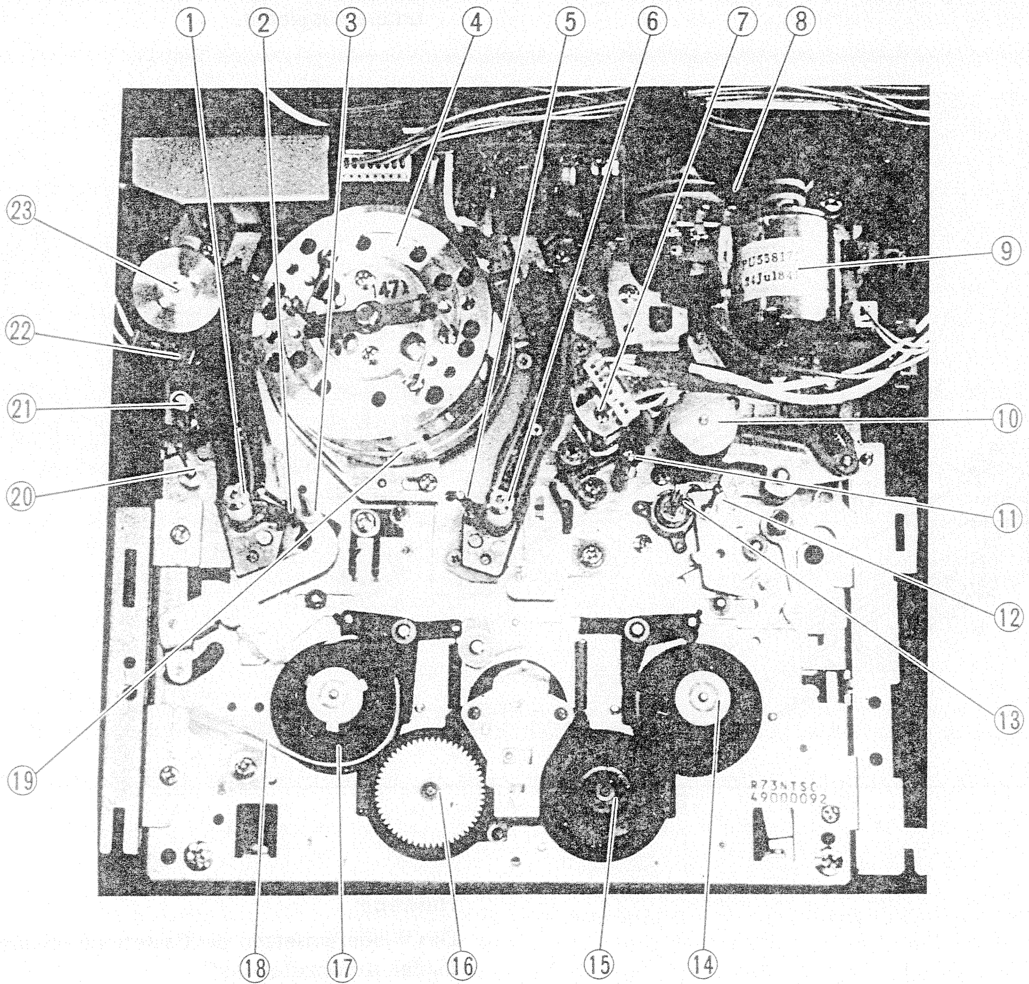


Abb. 2-2-1 Draufsicht

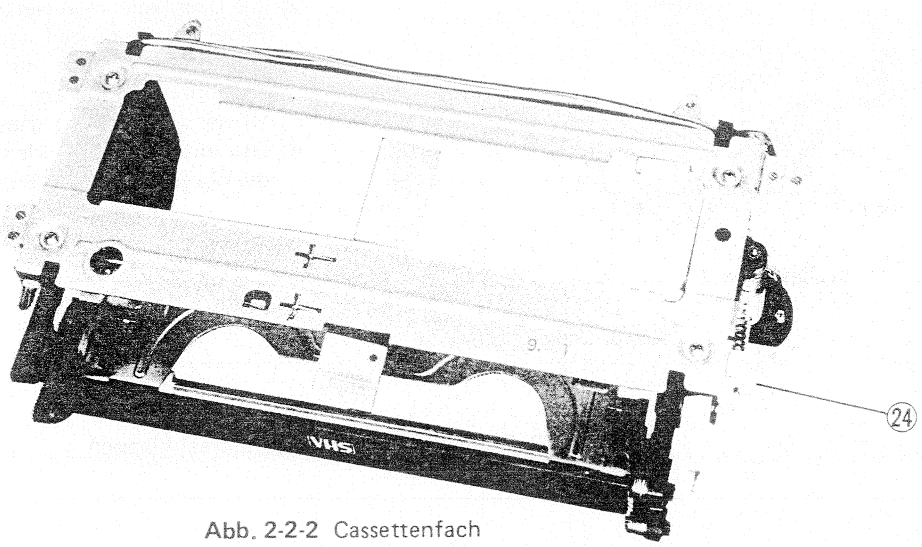


Abb. 2-2-2 Cassettenfach

2. Unteransicht

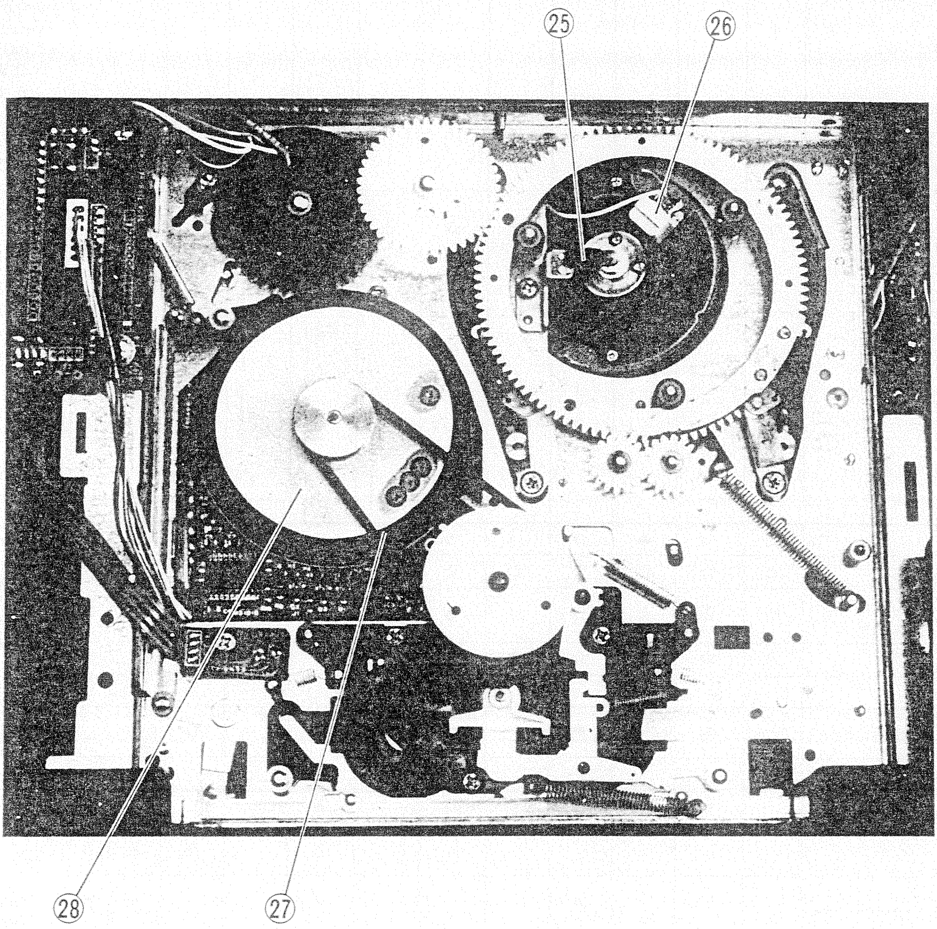


Abb. 2-2-3 Unteransicht

1 Abwickelführungsrolle
2 Schrägführungsbolzen (Abwickelführung)
3 Bandzugfühlhebel
4 Trommel
5 Schrägführungsbolzen (Aufwickelführung)
6 Aufwickelführungsrolle
7 Audio/Synchronkopf
8 Lademotorriemen
9 Lademotor
10 Andruckrolle
11 Aufwickelführungsstift
12 Führungsarm
13 Capstan
14 Aufwickelteller
15 Kupplung des Aufwickeltellers
16 Kupplung des Abwickeltellers
17 Abwickelteller
18 Bremsband
19 Motoreinheit
20 Abwickelführungsstift
21 Abwickelführungsbolzen
22 Gesamtlöschkopf
23 Spannrolle
24 Cassetteneinzugmotor
25 Bürste
26 Impulskopf
27 Wickelantriebsriemen
28 Capstanmotor

2. 2. 2 Wartungsplan für die Hauptkomponenten

Die in der nachstehenden Tabelle aufgelisteten Teile sollten in den angegebenen Zeitabständen regelmäßig gewartet werden.

	Teilebezeichnung	Ersatzteilnr.	Wartungszeitplan (Betriebsstunden)										Betreffender Abschnitt	Anmerkungen
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000		
Bandtransportsystem	Bandzugfühlhebel Schrägführungsbolzen (Abwickelführung) Abwickelführungsrolle Abwickelführungsstift Abwickelführungsbolzen Spannrolle Aufwickelführungsbolzen Capstan Führungsarm Aufwickelführungsrolle Schrägführungsbolzen (Aufwickelführung) Motoreinheit		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆		• Zum Reinigen ein fusselfreies, mit Alkohol angefeuchtetes Tuch verwenden. • Nach dem Reinigen mit Alkohol die Teile vor dem Einlegen einer Cassette trocknen lassen.
	Trommel		☆	○	●	☆	○	●	☆	○	●	☆	2. 3. 2	– Die Kontaktflächen der Köpfe auf der oberen Trommel NICHT in vertikaler Richtung abwischen. Die Videoköpfe beim Reinigen nur in Bandlaufrichtung (horizontal) ohne Druck hin- und her wischen.
	Gesamtlöschkopf		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2. 3. 3	
	Audio/Synchronkopf		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2. 3. 4	
	Andruckrolle		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2. 3. 5	
Antriebssystem	Capstanmotor											○	2. 3. 6	
	Wickelantriebsriemen			☆		●		☆		●		☆		
	Lademotor											○	2. 3. 7	
	Laderiemen			☆		●		☆		●		☆		
	Cassettenschachtmotor											○	2. 3. 8	
	Abwickelteller					△				△		○	2. 3. 9	– Nicht zu viel Öl auftragen.
	Aufwickelteller													
	Kupplung des Aufwickeltellers			○		○		○		○		○	2. 3. 10	– Drehmoment-Überprüfung (siehe Abschnitt 2. 4. 3).
	Kupplung des Abwickeltellers													
Andere	Bürste		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2. 3. 11	
	Bremsband			○		○		○		○		○	2. 3. 12	– Bandzug-Messung (siehe Abschnitt 2. 4. 4).
	Impulskopf												2. 3. 13	

☆ Reinigen ● Auswechseln △ Ölen ○ Überprüfen und ggf. auswechseln

Tabelle 2-2-1 Normale Wartungszeiten

Die oben aufgeführten Auswechselzeiten können je nach Umgebungs- und Betriebsbedingungen beträchtlich schwanken. Die Lebensdauer der Teile hängt außerdem auch von der regelmäßigen Überprüfung und Wartung ab. Gummiteile können nach langer Lagerzeit Alterungs- oder Verwerfungserscheinungen zeigen, auch wenn das Gerät nicht in Gebrauch war.

Hinweis:
Auch bei nur unregelmäßigen Gebrauch sollte das Gerät alle zwei Jahre gereinigt, geölt und seine Antriebsriemen ausgetauscht werden.

2.3 AUSTAUSCH DER HAUPTKOMPONENTEN

Zum Austauschen von Teilen alle Gehäuseverkleidungen abnehmen und gegebenenfalls behindernde Schaltplatinen ausbauen.

2.3.1 Cassettenfach

- Ausbau des Cassettenfachs

1. Die Schrauben ① herausdrehen und die zwei Halteläschen von der Servoplatine (MAIN-PCB) lösen. Dann die Servoplatine (MAIN) aufklappen.
2. Den Anschluß CN1 der Servoplatine (MAIN) von der Cassettenfachplatine (CASS. HOUSING) abtrennen.
3. Die vier Schrauben ② lösen und den Erdungsschleifer abnehmen.
4. Das Cassettenfach vorsichtig anheben, um es zu entfernen.

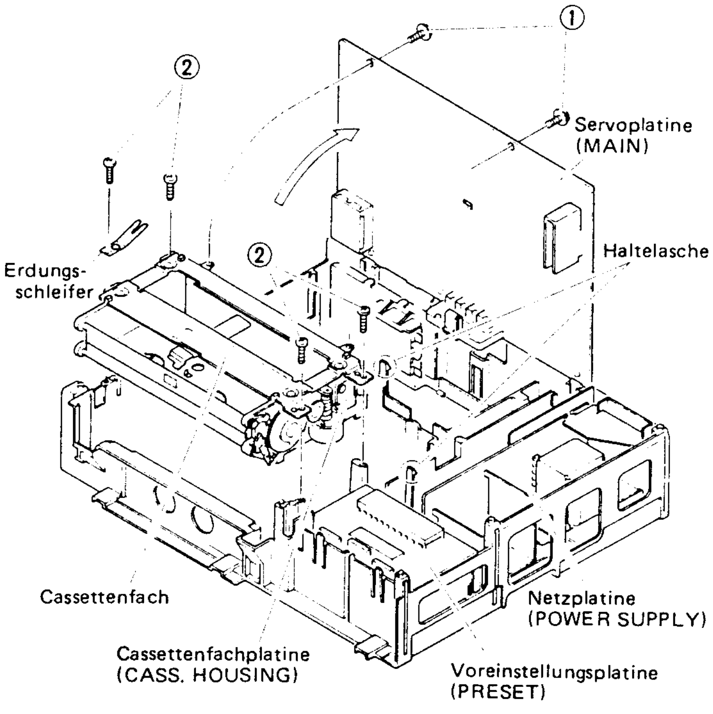

①
②
Servoplatine (MAIN)
Haltelasche
Erdungsschleifer
②
Cassettenfach
Netzplatine (POWER SUPPLY)
Cassettenfachplatine (CASS. HOUSING)
Voreinstellungsplatine (PRESET)

Abb. 2-3-1 Ausbau des Cassettenfachs

- Betrieb des Geräts ohne Cassette

Für Wartungs- und Meßverfahren, die einen Betrieb des Gerätes ohne Bandberührung an der Kopftrommel erfordern, muß das Cassettenfach aus dem Geräteinnern entfernt und auf die unten beschriebene Stelle gesetzt werden.

1. Ein Blatt eines Isolationsmaterials (Karton, Plastik usw.) über die Voreinstellungs- (PRESET) und Netzplatine (POWER SUPPLY) auf der rechten Seite des Chassis legen.
2. Das Cassettenfach aus dem Geräteinneren entnehmen und auf das isolierte Material über der Voreinstellungs- (PRESET) und Netzplatine (POWER SUPPLY) legen. Jedoch den Anschluß CN1 von der Servoplatine (MAIN) nicht abtrennen.
3. Eine Cassette in das Fach einlegen. Der Einzugsmechanismus funktioniert nach wie vor.
   Hinweise:
   1) Um das Abgleichband vor versehentlichen Löschungen zu schützen, sollten die Aufnahmeschutzlaschen der Cassette vor dem Laden entfernt werden.
   2) Sicherstellen, daß die Cassette nicht zum Bandende oder -beginn gespult ist.
4. Da sich die betreffenden Sensoren alle im Cassettenfach befinden, können nach dem Einziehen der Cassette alle erwünschten Betriebsarten mit Hilfe der Bedienungselemente eingeschaltet werden.

2.3.2 Kopftrommel

1. Löten Sie die 8 Anschlußdrähte vorsichtig ab (Dabei zügig vorgehen, um die Drähte nicht durch Überhitzen zu beschädigen).

Relaisstiftfarbe	KANAL	INNERER/ÄUSSERER
Braun	SP, CH-1	Braun/Grün
Rot	SP, CH-2	Rot/Weiß (transparent)
Blau	EP, CH-1	Blau/Schwarz
Orange	EP, CH-2	Orange/Gelb

Tabelle 2-3-1 Verdrahtung der Kopftrommel

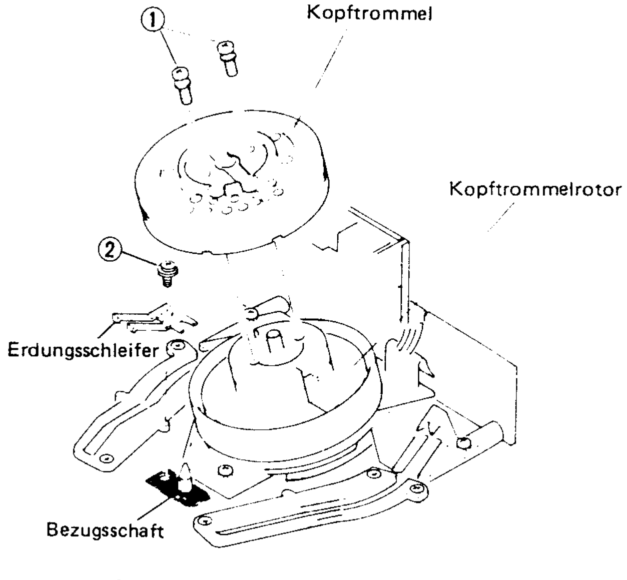


Abb. 2-3-3 Austausch der Kopftrommel

2. Die zwei Schrauben ① entfernen und die Kopftrommel nach oben abziehen.
3. Die Unterseite der neuen Kopftrommel und die Oberseite des Rotors vor dem Einbau mit Alkohol reinigen. Beim Umgang und Einbauen der neuen Kopftrommel die Videoköpfe nicht berühren und die Bandlauffläche der Trommel vor Kratzern schützen.
4. Der Einbau geht in umgekehrter Reihenfolge vor sich. Beim Löten die in Tabelle 2-3-1 angegebene Anschlußfolge beachten und die Anschlußdrähte nicht überhitzen.

5. Kopftrommel zentrieren.

1) Das Gerät bei herausgenommenem Cassettenfach auf Wiedergabe schalten (siehe Abschnitt 2. 3. 1). Nach abgeschlossenem Cassetteneinzug das Gerät vom Netz trennen.
2) Schraube ② herausdrehen und den Erdungsschleifer entsprechend Abb. 2-3-2 entfernen.
3) Die Zentrierlehre entsprechend Abb. 2-3-3 auf den Bezugsschaft aufsetzen. Die Halteschraube mit einem Steckschlüssel festziehen.

Achtung:
Die Zentrierlehre dient zum Messen der Exzentrizität der Kopftrommel.
Beim Gebrauch dieses Meßgerätes folgende Vorsichtsmaßnahmen beachten:

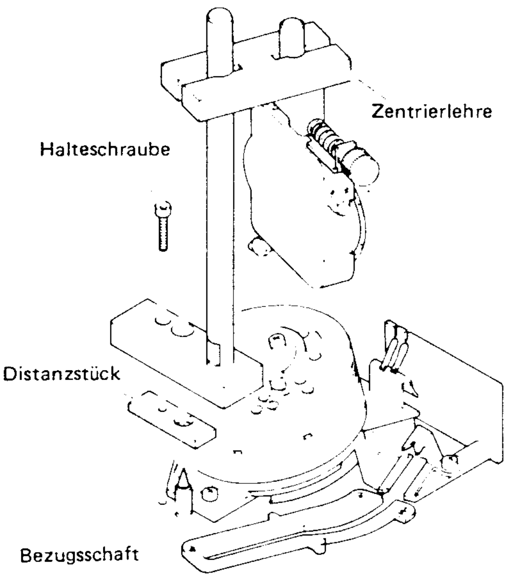


Abb. 2-3-3 Aufsetzen der Zentrierlehre

- **Da dieses Instrument äußerst präzise ist, muß es unbedingt vor Fall und Vibrationen geschützt werden.**
- Keinen starken Druck auf die Meßspitze ausüben.
- Der äußere Skalenring kann um ungefähr 7 Skalenteilungen gedreht werden. Diesen nicht gewaltsam drehen (mit einer größeren Kraft als 300 pcm).
- **Darauf achten, daß das Instrument nicht die Videoköpfe berührt.**
- Die Justierschraube vor dem Aufsetzen so weit gegen den Uhrzeigersinn drehen, bis kein Federdruck mehr gespürt wird.
- **Während dem Aufsetzen der Zentrierlehre das Gerät niemals einschalten.**

4) Die Position der Zentrierlehre überprüfen und ggf. ausrichten. Die korrekte Position ist erreicht, wenn:

- Sich die Meßspitze 2 bis 3 mm unterhalb der Oberfläche der Kopftrommel befindet.
- Die Bewegungsrichtung der Meßspitze zum Trommelzentrum verläuft.

5) Die Justierschraube nach und nach im Uhrzeigersinn anziehen, bis die Meßspitze die Kopftrommel berührt. Die Anzeigenadel muß jedoch noch auf 0 stehen.
6) Die Trommel langsam drehen und die Zentrumsabweichung auf der Meßskala ablesen. Beim Drehen keinesfalls seitlichen Druck auf die Trommel ausüben.

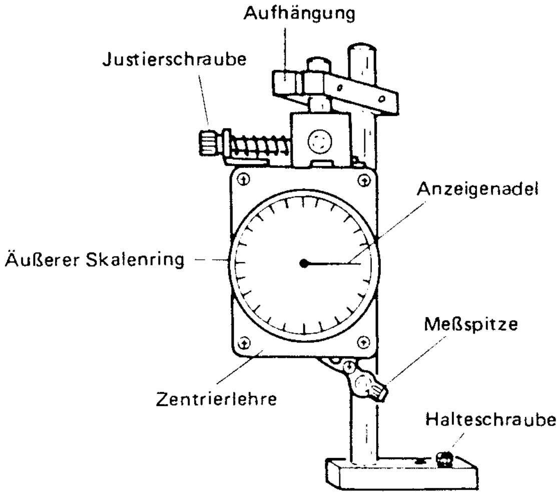


Abb. 2-3-4 Zentrierlehre

7) Die angezeigte Abweichung sollte keinesfall mehr als 4 Mikron betragen.
8) Falls die Abweichung mehr als 4 Mikron beträgt, zuerst die Justierschraube gegen den Uhrzeigersinn drehen, um die Meßspitze von der Trommel abzuheben und dann die zwei mit ① bezeichneten Schrauben lösen. Die Position der Kopftrommel anschließend vorsichtig ausrichten und die beiden Schrauben abwechselnd nach und nach festziehen. Die Schritte 4) bis 6) wiederholen.
9) Nach erfolgreicher Einstellung die Justierschraube gegen den Uhrzeigersinn drehen und die Zentrierlehre abnehmen.
10) Nach Einbau des Erdungsschleifers das Gerät einschalten und auf Stop stellen.

6. Die Kompatibilitätseinstellung vornehmen (siehe Abschnitt 2. 4. 6).

2. 3. 3 Gesamtlöschkopf

1. Den Anschluß CN1 vom Gesamtlöschkopf lösen.
2. Die Schraube ① entfernen und den Gesamtlöschkopf vom Löschkopfarm abnehmen.
3. Den Gesamtlöschkopf austauschen und zum Einbau die Schritte 1 und 2 in umgekehrter Reihenfolge vornehmen.

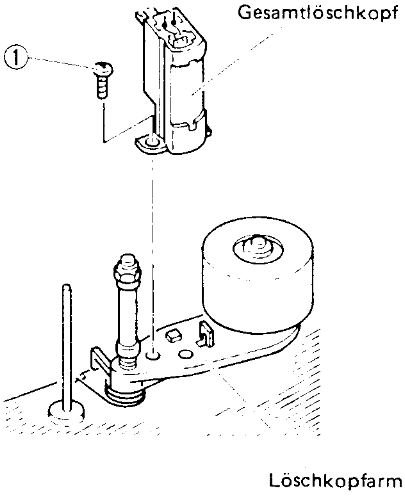


Abb. 2-3-5 Austausch des Gesamtlöschkopfes

2. 3. 4 Audio/Synchronkopf

1. Die Anschlüsse CN1 und CN2 von der Platine des Audio/Synchronkopfes (A/CTL HEAD) abtrennen.
2. Die Schrauben ① entfernen und den Audio/Synchronkopf mit seinem Sockel abnehmen.

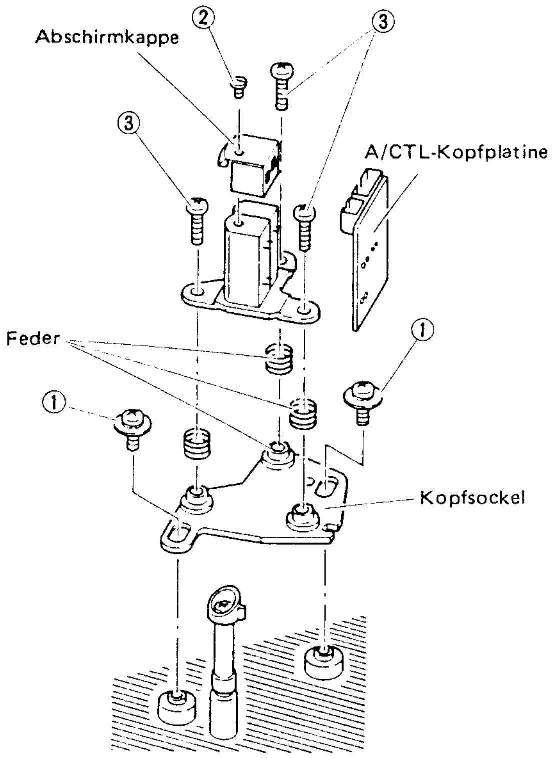

②
③
Abschirmkappe
③
A/CTL-Kopfplatine
Feder
①
①
Kopfsockel

Abb. 2-3-6 Austausch des Audio/Synchronkopfes

3. Die sechs Anschlüsse der Köpfe entlöten und die Audio/Synchronkopfplatine (A/CTL HEAD) abnehmen.
4. Die Schrauben ② entfernen und die Abschirmkappe vom Kopf abziehen.
5. Die Schrauben ③ lösen, um den Audio/Synchronkopf vom Sockel abzunehmen. Dabei auf die Federn achten.
6. Den Audio/Synchronkopf austauschen und den Einbau in umgekehrter Reihenfolge durchführen.
   Vor dem Einbau in das Chassis eine Grobeinstellung der Kopfhöhe entsprechend Abb. 2-3-7 vornehmen.

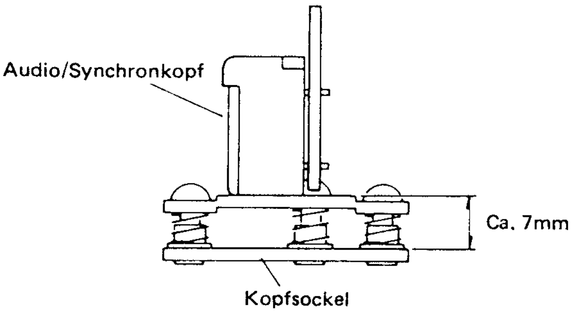

Audio/Synchronkopf
Ca. 7mm
Kopfsockel

Abb. 2-3-7 Audio/Synchronkopf-Höhe

7. Kompatibilität und Bandtransport überprüfen und ggf. einstellen (siehe Abschnitte 2. 4. 5 und 2. 4. 6).

2. 3. 5 Andruckrolle

1. Die Sprengringe ① und ② entfernen und den Andruckrollenarm abheben.
2. Nach dem Reinigen den Andruckrollenschaft schmieren.
3. Den Andruckrollenarm austauschen und den Einbau in umgekehrter Reihenfolge vornehmen. Kein Schmiermittel auf die Andruckrolle bringen.

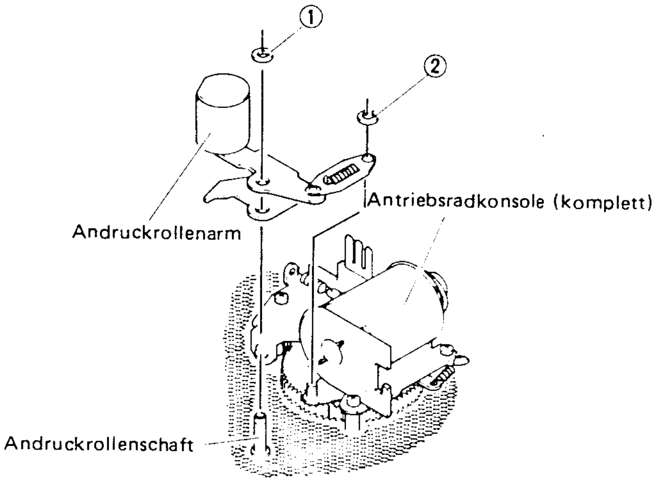

①
②
Antriebsradkonsole (komplett)
Andruckrollenarm
Andruckrollenschaft

Abb. 2-3-8 Austausch der Andruckrolle

2. 3. 6 Capstanmotor

1. Den Sprengring ① entfernen und den Führungsarm mit der Feder abnehmen.
2. Den Anschluß CN3 von der Verbindungsplatine (DECK TERMINAL) abtrennen.

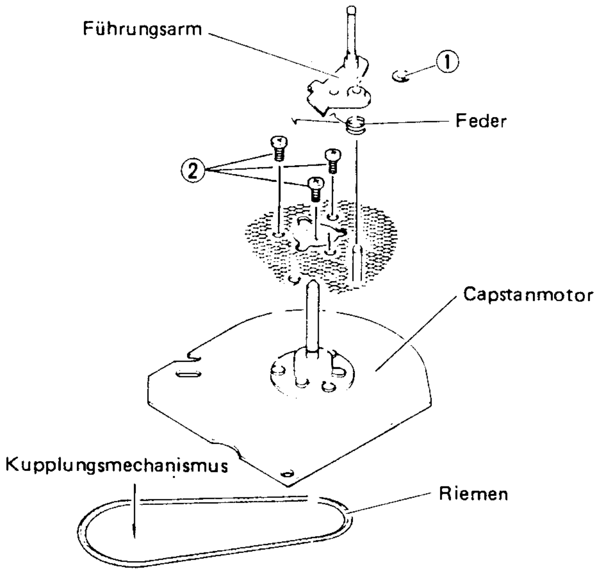

Führungsarm
①
Feder
②
Capstanmotor
Kupplungsmechanismus
Riemen

Abb. 2-3-9 Austausch des Capstanmotors

3. Den Riemen vom Capstanmotor und der Riemenscheibe der Kupplung abnehmen.
4. Die drei Schrauben ② lösen und den Capstanmotor nach unten herausnehmen. Dabei auf die Motorbremse achtgeben.
5. Den Capstanmotor austauschen und den Einbau in umgekehrter Reihenfolge ausführen.

2. 3. 7 Lademotor

1. Die Schrauben ①, ② und ③ entfernen, um das Abschirmblech herausnehmen zu können.
2. Den Laderiemen von der Riemenscheibe des Motors lösen.
3. Anschluß CN1 von der Motorplatine abziehen. Die Schrauben ④ und ⑤ herausdrehen und den Lademotor entfernen.
4. Den Lademotor durch Entlöten von der Motorplatine trennen und austauschen.
5. Der Einbau des Motors wird in umgekehrter Reihenfolge ausgeführt. Dabei auf die Polarität achten.

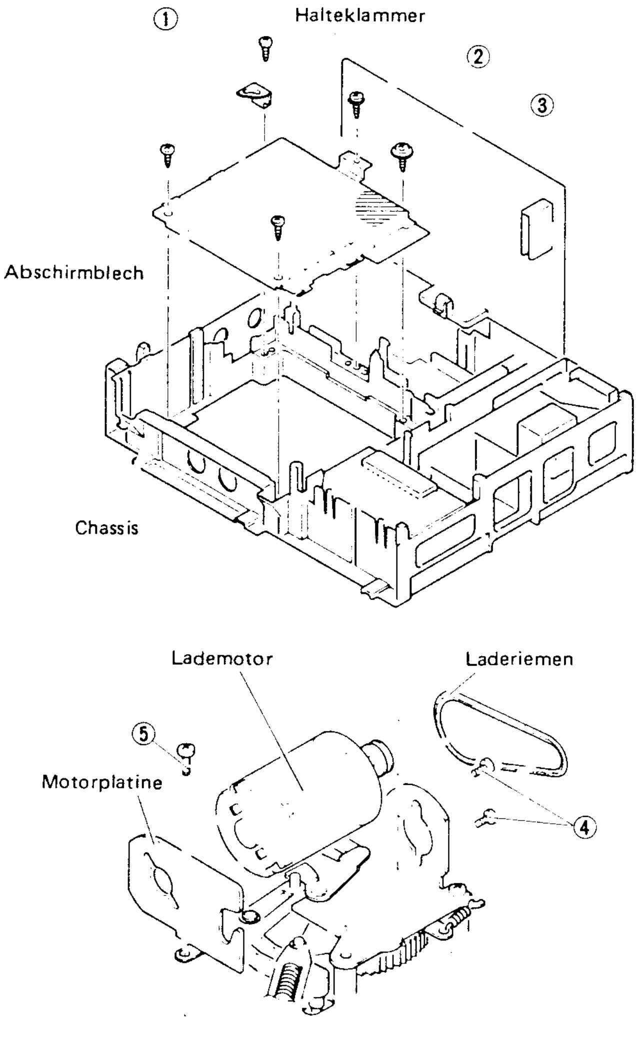


Abb. 2-3-10 Ausbau des Lademotors

2. 3. 8 Cassetteneinzugmotor

1. Das Cassettenfach nach Abschnitt 2. 3. 1 ausbauen.
2. Die zwei Drähte vom Einzugmotor entlöten.

UNTERSCHEIDUNG	DRAHTFARBE
Dicke Litze	Weiß
Dünne Litze	Grau

Tabelle 2-3-2 Verdrahtung des Einzugmotors

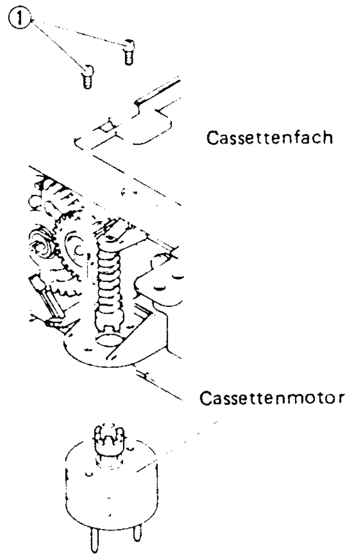


Abb. 2-3-11 Austausch des Cassetteneinzugmotors

3. Die zwei Schrauben ① lösen und den Einzugmotor abnehmen.
4. Den Einzugmotor austauschen und den Einbau in umgekehrter Reihenfolge vornehmen. Dabei auf korrekte Polarität achten (siehe Tabelle 2-3-2).
5. Das Cassettenfach in die ursprüngliche Stellung einbauen.

2. 3. 9 Wickelteller

- Abwickelteller

1. Den Sprengring ① abziehen und die Abwickelladebremse samt Feder abnehmen.
2. Den Bremsbandhalter vom Bandzugarm lösen und das Bremsband zur Seite schieben.
3. Den Sprengring ② abnehmen und den Abwickelteller nach oben abziehen. Dabei auf die Beilagscheiben achten.
4. Nach dem Reinigen des Tellerschafts mit Alkohol, den Schaft mit einem Tropfen Nähmaschinenöl schmieren. Dabei nicht zu viel Öl auftragen.
5. Den Abwickelteller austauschen und den Einbau in umgekehrter Reihenfolge ausführen.
6. Die Bandzugmessung entsprechend Abschnitt 2. 4. 4 vornehmen.

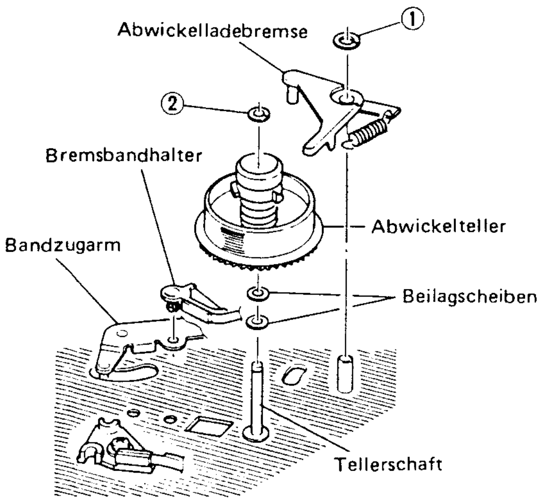

Abwickelladebremse
①
②
Bremsbandhalter
Bandzugarm
Abwickelteller
Beilagscheiben
Tellerschaft

Abb. 2-3-12 Austausch des Abwickeltellers

- Aufwickelteller

1. Den Sprengring ① entfernen und die Aufwickelladebremse zur Seite schieben, während der Aufwickelteller nach oben abgezogen wird. Dabei auf die Beilagscheiben achten.
2. Nach dem Reinigen des Tellerschafts mit Alkohol, den Schaft mit einem Tropfen Nähmaschinenöl schmieren. Dabei nicht zu viel Öl auftragen.
3. Den Aufwickelteller austauschen und den Einbau in umgekehrter Reihenfolge ausführen.

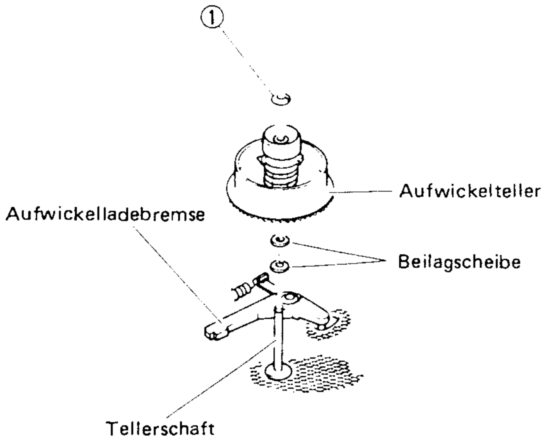

①
Aufwickelteller
Aufwickelladebremse
Beilagscheibe
Tellerschaft

Abb. 2-3-13 Austausch des Aufwickeltellers

2.3.10 Kupplungsmechanismus

- Aufwickel- und Abwickeltellerkupplungen

1. Die Aufwickelspule entsprechend Abschnitt 2. 3. 9 entfernen.
2. Den Sprengring ① entfernen, die Aufwickelbremse seitlich verschieben und die Aufwickeltellerkupplung abziehen. Dabei auf die Beilagscheiben unter der Kupplung achten.
3. Nach dem Reinigen des Kupplungsschafts mit Alkohol, den Schaft mit einem Tropfen Nähmaschinenöl schmieren. Dabei nicht zu viel Öl auftragen.
4. Die Aufwickeltellerkupplung austauschen und den Einbau in umgekehrter Reihenfolge ausführen.
5. Die Abwickelspule auf gleiche Weise entfernen und die Abwickeltellerkupplung austauschen.
6. Die Drehmoment-Überprüfung vornehmen (siehe Abschnitt 2. 4. 3).

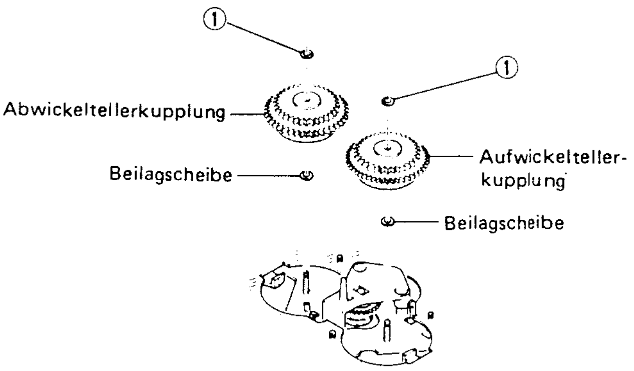

①
①
Abwickeltellerkupplung
Beilagscheibe
Aufwickelteller-kupplung
Beilagscheibe

Abb. 2-3-14 Kupplungsaustausch

- Kupplungsmechanismus

1. Die fünf Federn vom Kupplungsmechanismus abnehmen. Diese Federn kommen von Abwickel-, Aufwickelladebremse, Bremsschieber, Abwickel- und Aufwickelbremse.
2. Den Tellerriemen von der Riemenscheibe des Kupplungsmechanismus lösen.
3. Die Schraube ① herausdrehen und den Kupplungsmechanismus entfernen.

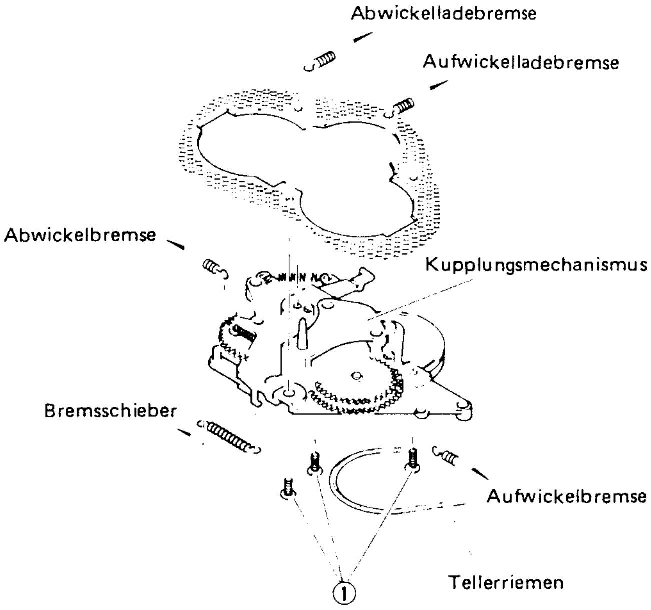

Abwickelladebremse
Aufwickelladebremse
Abwickelbremse
Kupplungsmechanismus
Bremsschieber
Aufwickelbremse
Tellerriemen
①

Abb. 2-3-15 Austausch des Kupplungsmechanismus

4. Den Kupplungsmechanismus austauschen und den Einbau in umgekehrter Reihenfolge vornehmen.
5. Die Drehmoment-Überprüfung nach Abschnitt 2. 3. 4 durchführen.

2. 3. 11 Bürste

1. Die Schraube ① lösen, die Bürste abnehmen und den Kollektor mit Alkohol reinigen.
2. Die Bürste austauschen und den Einbau in umgekehrter Reihenfolge vornehmen. Dabei darauf achten, daß die Bürstenkontakte die Mitte des Kollektors berühren.

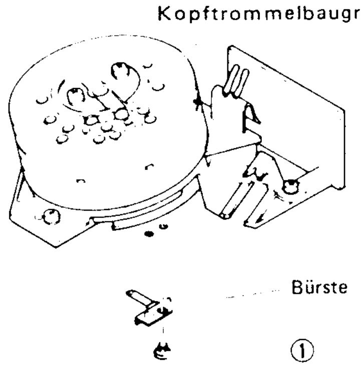

Kopftrommelbaugruppe
Bürste
①

Abb. 2-3-16 Bürstenaustausch

2. 3. 12 Bremsband

1. Den Sprengring ① lösen und die Abwickelladebremse samt Feder abnehmen.
2. Die Schraube ② herausdrehen und das Bremsband vom Bandzugarm entfernen und austauschen.

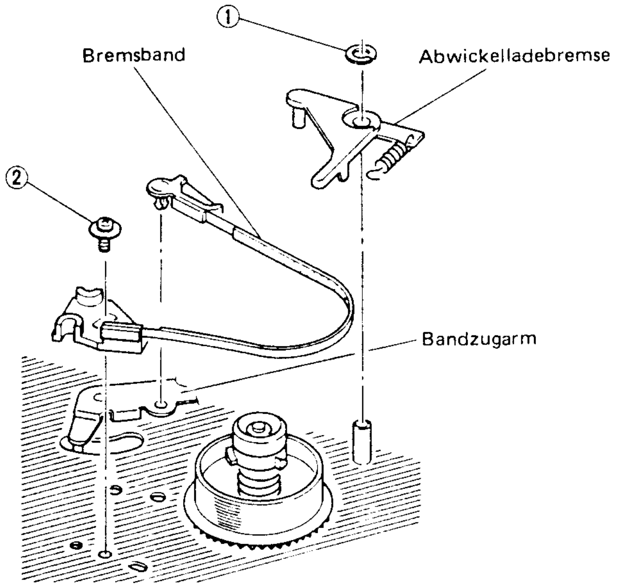

①
Bremsband
Abwickelladebremse
②
Bandzugarm

Abb. 2-3-17 Bremsbandaustausch

3. Das Bremsband in umgekehrter Reihenfolge einbauen.
4. Die Position des Bandzugfühlhebels überprüfen und die Drehmomentsmessung durchführen (siehe Abschnitte 2. 4. 2 und 2. 4. 4).

2.3.13 Impulskopf

1. Die zwei Drähte von den Anschlüssen des Impulskopfes entlöten.
2. Die Schraube ① entfernen und den Impulskopf abheben.
3. Den Impulskopf austauschen und den Einbau in umgekehrter Reihenfolge ausführen. Dabei auf Polarität achten. Sicherstellen, daß der Impulskopf auf die Mitte des Trommelschafts weist.

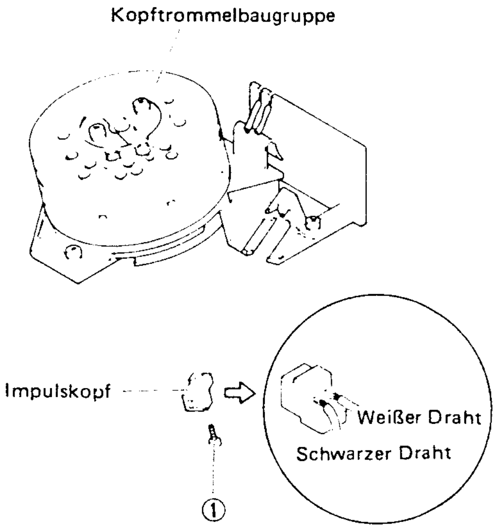

Kopftrommelbaugruppe
Impulskopf
Weißer Draht
Schwarzer Draht
①

Abb. 2-3-18 Austausch des Impulskopfes

2. 4 MESSUNGEN UND EINSTELLUNGEN

2. 4. 1 Mechanikeinstellungen

- Laderinge und Laderad (2)

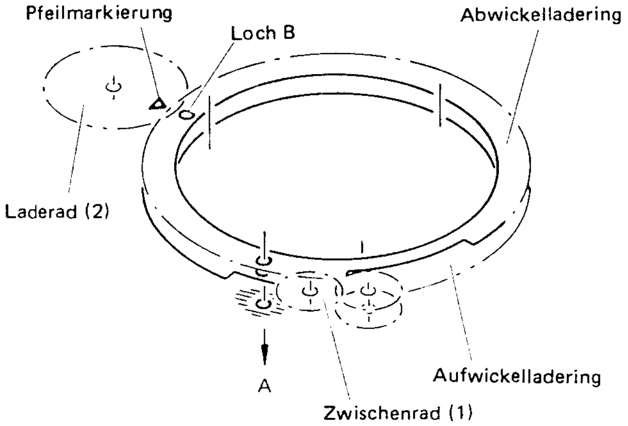


Abb. 2-4-1 Ladering/Laderad (2)

1. Überprüfen, ob sich die beiden Löcher im Abwickel- und Aufwickelladering mit dem Loch im Abschirmblech (Pfeil A in der Abb.) überlappen. Falls nicht, das Zwischenrad (1) entfernen und die Laderinge in die korrekte Position bringen. Die Löcher überdecken sich bei Stop (FF/REW).
2. Gleichzeitig sicherstellen, daß die Pfeilmarkierung des Laderades (2) mit Loch B im Abwickelladering zur Deckung kommt. Falls nicht, das Laderad (2) entfernen und in korrekter Stellung wieder einbauen.

- Kurvenscheibe (Antriebsradkonsole) und Laderad (1)

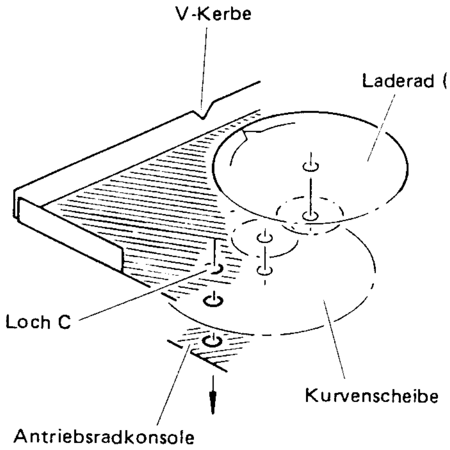


Abb. 2-4-2 Kuvenscheibe/Laderad (1)

1. Darauf achten, daß der Pfeil auf dem Laderad (1) auf die V-Kerbe weist, wenn die Löcher in Kurvenscheibe und Antriebsradkonsole mit Loch C im Abschirmblech (FF/REW-Position) zur Deckung kommen. Falls nicht, das Laderad (1) lösen und ausrichten.

2. 4. 2 Überprüfung der Position des Bandzugfühlhebels

1. Das Gerät ohne eingelegte Cassette auf Wiedergabe schalten (siehe Abschnitt 2. 3. 1).
2. Sicherstellen, daß das Zentrum des Bandzugfühlhebels entsprechend Abb. 2-4-3 auf der linken Seite der Buchse des Abwickelführungsstifts steht.
3. Gegebenenfalls Schraube ① lösen und den Bremsbandhalter ausrichten, um die Position des Bandzugfühlhebels zu korrigieren.

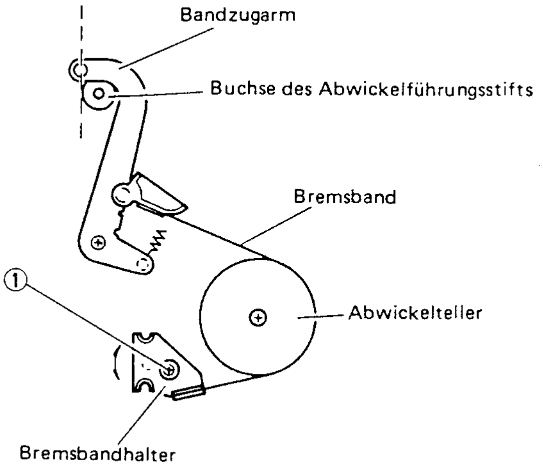


Abb. 2-4-3 Position des Bandzugfühlhebels

2. 4. 3 Drehmomentmessung des Aufwickelzuges

1. Das Gerät bei herausgenommenen Cassettenfach auf Wiedergabe schalten (siehe Abschnitt 2. 3. 1).
2. Die Drehmomentmeßuhr auf den Aufwickelteller aufsetzen.
3. Die Drehmomentmeßuhr besteht aus einem oberen und unteren Teil, die durch eine Feder miteinander verbunden sind. Die Drehmomentmeßuhr so festhalten, daß sich Anzeigenadel und Skala mit gleichmäßiger Geschwindigkeit bewegen und dann die Anzeige ablesen. Der Aufwickelzug sollte zwischen 60 und 100 pcm betragen.
4. Falls der Meßwert nicht im zulässigen Bereich liegt, Auf- und Abwickelkupplung austauschen.

2. 4. 4 Bandzugmessung

1. Eine Bandzugmeßcassette einlegen und auf Wiedergabe schalten.
2. Überprüfen, ob der Bandzug zwischen 11 und 19 pcm liegt.
3. Falls der Meßwert nicht im zulässigen Bereich liegt, die Position des Bandzugfühlhebels (siehe Abschnitt 2. 4. 2) und den Zustand der Feder zwischen Chassis und Bandzugarm überprüfen und das Bremsband auswechseln (siehe Abschnitt 2. 3. 12).
4. Gegebenenfalls den Abwickelteller austauschen (siehe Abschnitt 2. 3. 9).

2. 4. 5 Überprüfung und Einstellung des Bandtransportsystems

Das Bandtransportsystem wurde im Werk präzise eingestellt. Im Normalfall sind Nachjustierungen nicht erforderlich. Die nachfolgenden Überprüfungen sind daher nur bei starker Beanspruchung oder bei Erneuerung eines Teils im Bandtransportsystems notwendig.

- Überprüfung des Bandlaufs

1. Eine E180 Cassette einlegen und den Bandlauf gemäß den nachfolgenden Schritten am Bandanfang und -ende überprüfen.

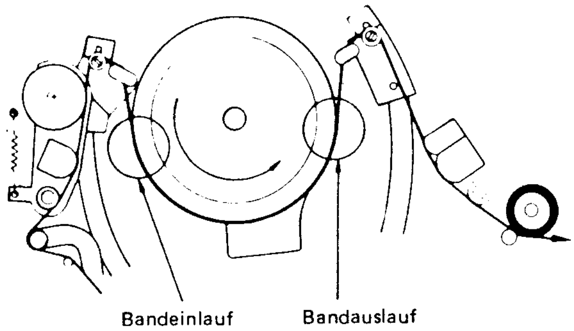
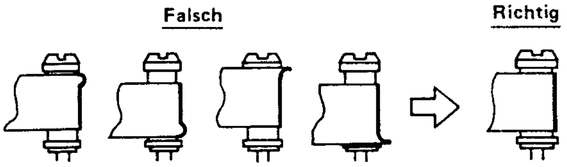
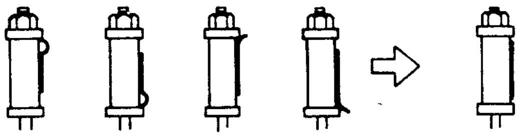


Abb. 2-4-4 Bandeinlauf/Bandauslauf

1) Den Bandein- und auslauf an der Lauffläche der Kopftrommel in der Wiedergabebetriebsart prüfen.
Sicherstellen, daß das Band nicht über die Führungskanten hinausläuft.



(a) Führungsrolle



(b) Führungsbolzen

Abb. 2-4-5 Führungsrolle/-bolzen

2) Falls der Bandlauf nicht korrekt ist, die Höheneinstellung der Bandführungsrollen korrigieren.
3) Den Bandlauf in der Wiedergabebetriebsart zwischen Aufwickel- und Abwickelführungsbolzen sowie Führungsrollen beobachten.
Sicherstellen, daß das Band nicht knittert oder sich verwirft.
4) Falls der Bandlauf nicht korrekt ist, die Höhe des Abwickelführungsbolzen und den Neigungswinkel des Audio/Synchronkopfes korrigieren.

2. Am Bandende der E180 Cassette den Bandlauf im Rückwärtsbildsuchlauf (9-fache Geschwindigkeit) beobachten.

1) Sicherstellen, daß das Band am Aufwickelführungsbolzen nicht knittert, verrutscht usw.
2) Falls der Bandlauf nicht korrekt ist, die Gummiandruckrolle überprüfen.

3. Kompatibilität gemäß 2. 4. 6 überprüfen und einstellen.

- Höheneinstellung der Führungsrollen

1. Die Halteschraube unter der Führungsrolle etwas lockern.
2. Eine Cassette einlegen und auf Wiedergabe schalten.
3. Die Führungsrolle mit einem Schraubenzieher vorsichtig drehen, bis das Band glatt an den Leitflächen der Kopftrommel entlangläuft und nicht nach oben oder unten verrutscht.

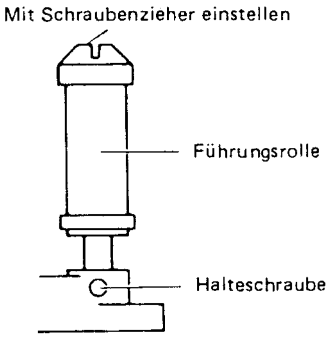


Abb. 2-4-6 Höheneinstellung der Führungsrolle

Hinweise:

1) Die Halteschraube nur so weit lockern, bis sich die Führungsrolle drehen läßt.
Bei zu lockerer Halteschraube dreht sich die Rolle mit dem Band mit.
2) Die Führungsrollen vorsichtig drehen, damit das Band nicht beschädigt wird.

- Höheneinstellung des Abwickelführungsbolzens

1. Eine Cassette einlegen und auf Wiedergabe schalten.
2. Mit einem Steckschlüssel die Mutter so drehen, daß die Bandunterkante genau nach der Oberfläche des unteren Flansches des Bandführungsbolzens ausgerichtet ist.

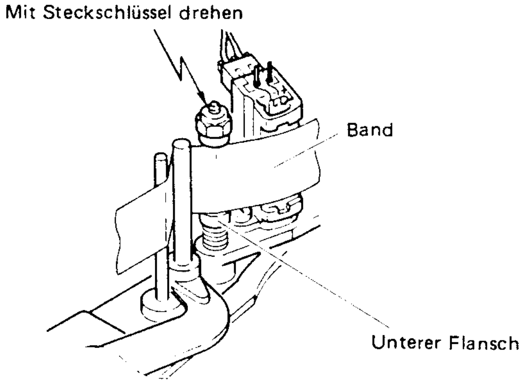


Abb. 2-4-7 Höhe des Abwickelführungsbolzens

- Neigung des Audio/Synchronkopfes

1. Eine Cassette einlegen und auf Wiedergabe schalten.
2. Durch Drehen der Schraube ① den Audio/Synchronkopf so einstellen, daß die Bandunterkante genau über den unteren Flansch des Bandführungsbolzen läuft.

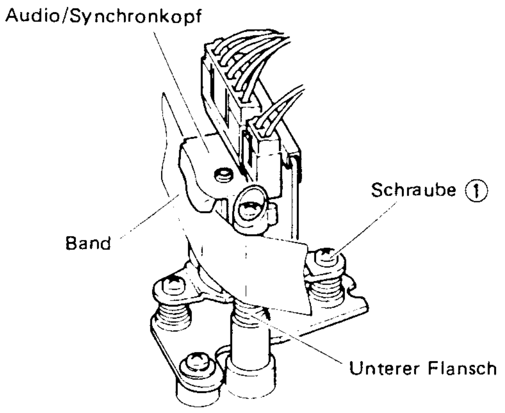


Abb. 2-4-8 Neigung des Audio/Synchronkopfes

Hinweis:
Die Höhe des Aufwickelführungsbolzen kann nicht verstellt werden.

2. 4. 6 Überprüfung und Einstellung der Kompatibilität

Vor dem Einlegen der Abgleichcassette den Bandlauf mit einer normalen Cassette nachprüfen.

- Vorbereitende Prüfungen und Einstellungen

1. Einen Oszillografen an Testpunkt TP6 (FM PB) der Servoplatine (MAIN) anschließen. Den Oszillografen mit dem Signal von TP411 (DRUM F.F.) auf der Servroplatine extern triggern.
2. Das Grautreppensignal der Abgleichcassette MH-2 wiedergeben.

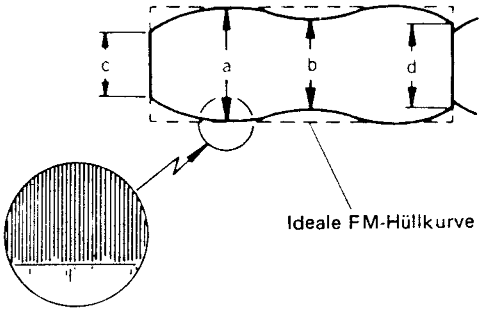


Abb. 2-4-9 FM-Hüllkurvenform (max. Amplitude)

1) Mit Hilfe des TRACKING-Einstellers die FM-Hüllkurve auf ihre maximale Amplitude bringen.
Die FM-Hüllkurvenform beobachten und den max. Pegel (a) mit den min. Pegel (b), (c) und (d) vergleichen. Folgende Pegelverhältnisse müssen bestehen:

$$\frac{b}{a} \geqq 0{,}7, \ \frac{c}{a} \geqq 0{,}5 \text{ und } \frac{d}{a} \geqq 0{,}5$$

Hinweis:
Bei stark gewellter Hüllkurve die Werte an der gleichförmigsten Stelle ermitteln.

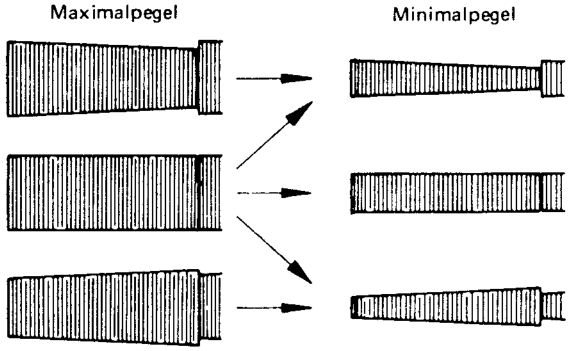


Abb. 2-4-10 Beispiele korrekter Wellenformen

2) Den TRACKING-Einsteller drehen, um den Pegel vom Maximum auf das Minimum zu bringen.
Die Abweichung der Hüllkurvenform sollte parallel verlaufen und der Abbildung entsprechen.
3) Bei korrektem Ergebnis zur Einstellung des Audio/Synchronkopfes übergehen.
Bei mangelhaftem Ergebnis die nachstehend aufgeführten Korrekturen vornehmen.

3. Die Halteschrauben der beiden Bandführungsrollen lockern. Falls sich die Führungsrollen frei drehen, die Schrauben etwas nachziehen.
4. Das Grautreppensignal des Abgleichbandes MH-2 wiedergeben.
5. Die Anzeige des Oszillografen beobachten und mit Hilfe des TRACKING-Einstellers die FM-Hüllkurve auf die max. Amplitude einstellen.

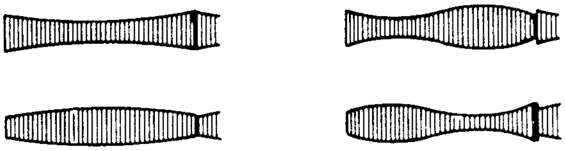


Abb. 2-4-11 Inkorrekte Hüllkurvenformen

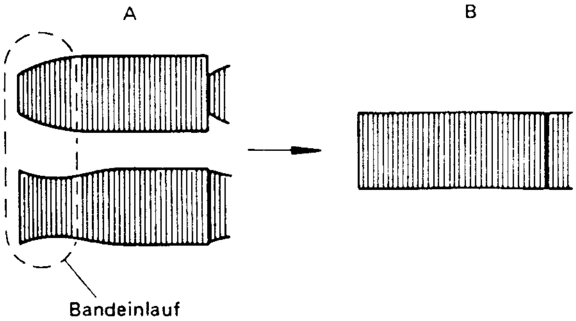


Abb. 2-4-12 Einstellung des Bandeinlaufs

1) Siehe Abb. 2-4-12. Inkorrekte Wellenformen werden unter Teil A aufgezeigt.
Mit einem Schraubenzieher die Abwickelführungsrolle so justieren, daß der ansteigende Abschnitt der Verlauf der Wellenform am Bandeinlauf, wie unter B gezeigt, flach wird.

2) Auf die gleiche Weise die Aufwickelführungsrolle zum Korrigieren der FM-Wellenform auf der Bandauslaufseite (fallender Verlauf) drehen.
Beispiele unzulässiger Wellenverläufe sind in Abb. 2-4-13 unter C gezeigt, während D die korrekte Form angibt.

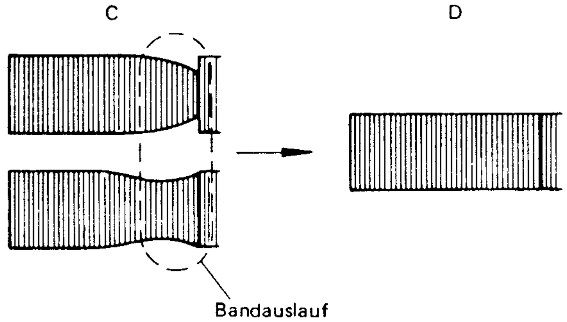


Abb. 2-4-13 Korrektur des Bandauslaufs

3) Nun noch einmal an den beiden Bandführungsbolzen auf einwandfreien Bandlauf prüfen.
Kommt es zum Abheben des Bandes an der Führung oder Knittern, die Höhe der Abwickelführungsbolzens (siehe Abschnitt 2. 4. 5) nachstellen.
Falls Mängel am Aufwickelführungsbolzen auftreten, diese durch Drehen der Schraube des Audio/Synchronkopfes beseitigen (siehe Abschnitt 2.4.5).

6. Den Verlauf der FM-Hüllkurve beobachten und mit Hilfe des TRACKING-Einstellers die Kurve auf das Minimum bringen.

1) Falls die Hüllkurve einen Verlauf entsprechend Teilbild A, B, C oder D in Abb. 2-4-14 aufweist, die Führungsrollen auf beiden Seiten vorsichtig justieren, so daß der resultierende Kurvenverlauf Teilbild E, F oder G entspricht.

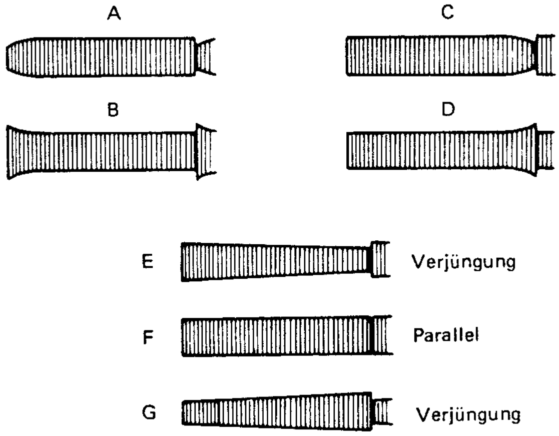


Abb. 2-4-14 Verlauf der FM-Kurve bei minimaler Amplitude

Hinweis:
Falls jetzt noch Schwankungen auftreten, diese auf ein Minimum bringen.

2) Die Amplitude der Hüllkurve variieren und eine Feineinstellung der Abwickel- und Aufwickelführungsrolle vornehmen.

- Azimut- und Höheneinstellung des Audio/Synchronkopfes
Eine falsche Höheneinstellung kann bei fremdbespielten Cassetten ein beeinträchtigtes Signal/Rauschverhältnis zur Folge haben.

1. Einen Oszillografen am AUDIO OUT-Anschluß auf der Servoplatine anschließen.
2. Den 6 kHz Teil (Grautreppensignal) des Abgleichbandes wiedergeben.

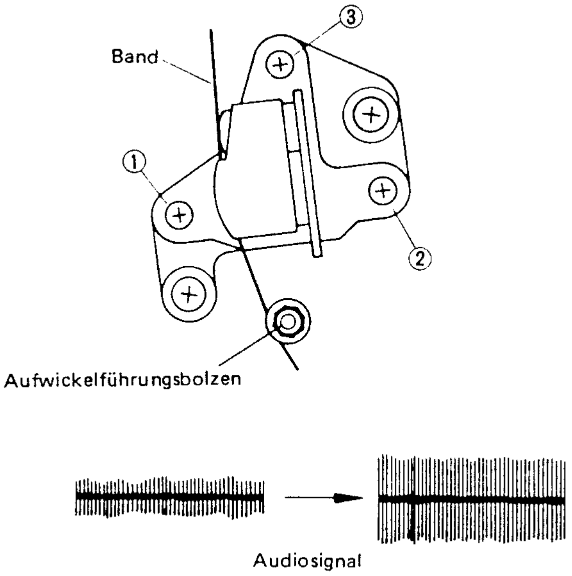


Abb. 2-4-15 Einstellung des Audio/Synchronkopfes

1) Die Schraube ② so einstellen, daß das Band am Aufwickelführungsbolzen keine Falten wirft. Mit Schraube ③ die Azimuteinstellung vornehmen.

2) Die Schrauben ①, ② und ③ um kleine und jeweils gleiche Beträge drehen, um die Höhe des Audio/Synchronkopfes so zu justieren, daß der maximale Audiopegel erreicht wird.
Schraube ① als Bezugspunkt nehmen und mit Schraube ② die Neigung einstellen. Der Azimut wird mit Schraube ③ justiert.
Hinweise:
a) Beim Einstellen die Bezugsschraube nicht mehr als eine 1/4-Drehung verstellen, um das Abgleichband vor Beschädigung zu schützen.
b) Nach der Einstellung der Neigung mit Schraube ② unbedingt die Azimuteinstellung mit Schraube ③ vornehmen.

3. Diese Einstellungen wiederholen, bis der maximale Audio-Ausgangspegel bei minimaler Pegelschwankung erzielt wird.

- Anziehen der Halteschrauben

1. Nachdem sichergestellt worden ist, daß sich das Band nicht verwirft und der Bandlauf einwandfrei ist, die Halteschrauben unter den Führungsrollen festziehen, während das Gerät auf Stop geschaltet ist.
Hinweis:
Da sich die Führungsrollen leicht bewegen, muß beim Festziehen der Halteschrauben darauf geachtet werden, daß diese sich nicht verstellen.

2. Die vorbereitenden Prüfungen erneut durchführen.

- Einstellen der Servoschaltung

1. Justierung des Tracking-Voreinstellers durchführen (siehe Abschnitt 3. 3. 4).

- Phaseneinstellung des Audio/Synchronkopfes

1. Einen Oszillografen an TP6 (PB FM) auf der Servoplatine (MAIN) anschließen. Den Oszillografen extern mit dem Signal von TP411 (DRUM F.F.) der Servoplatine triggern.
2. Die Abgleichcassette (Grautreppensignal) wiedergeben.
3. Mit der negativen Flanke triggern und die FM-Hüllkurvenform von Kanal 1 beobachten.

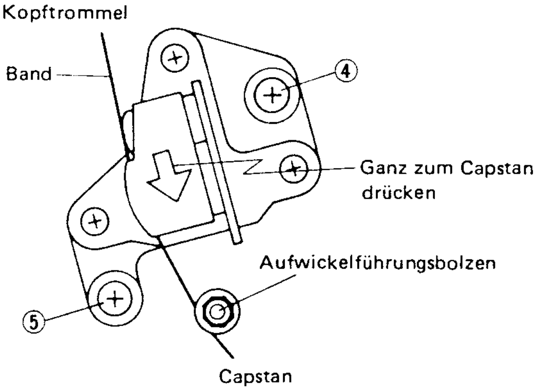


Abb. 2-4-16 Phaseneinstellung des Audio/Synchronkopfes

1) Den TRACKING-Einsteller in AUTO-Stellung (Mittelstellung) einrasten.
2) Die Schrauben ④ und ⑤ lösen. Den Audio/Synchronkopf bis zum Anschlag in Richtung des Capstans schieben (siehe Abb. 2-4-16).
3) Die Schraube ④ mit dem Kopf-Ausrichtwerkzeug abdecken und den Stift des Werkzeugs in das Loch neben Schraube ④ einführen.
4) Das Werkzeug nach und nach drehen und dabei die Amplitude der FM-Hüllkurve im Auge behalten. Bei Auftreten des ersten Hüllkurvenmaximums ist die optimale Stellung erreicht.
5) Die Schrauben ④ und ⑤ zum Fixieren des Kopfes festziehen.

- Endprüfung

1. Einen Oszillografen an TP6 (PB FM) der Servoplatine (MAIN PCB) anschließen. Den Oszillografen mit dem Signal von TP-411 (DRUM F.F.) auf der Servoplatine extern triggern.
   1) Die Abgleichcassette MH-2 (Grautreppensignal) abspielen. Sicherstellen, daß die Form der FM-Hüllkurve dem Wiedergabesignal der Abgleichcassette entspricht (siehe Abb. 2-4-9).
   2) Ein Videosignal aufnehmen und dann wiedergeben. Sicherstellen, daß die Hüllkurve die gleiche Form wie bei der Wiedergabe der MH-2 Abgleichcassette aufweist.
2. Alle Einstellungen der Servo- (siehe Abschnitt 3.3) und Videoschaltung (siehe Abschnitt 3. 4) überprüfen.
3. Die Audioschaltung entsprechend Abschnitt 3. 5 überprüfen.

ABSCHNITT 3
ELEKTRISCHE EINSTELLUNGEN

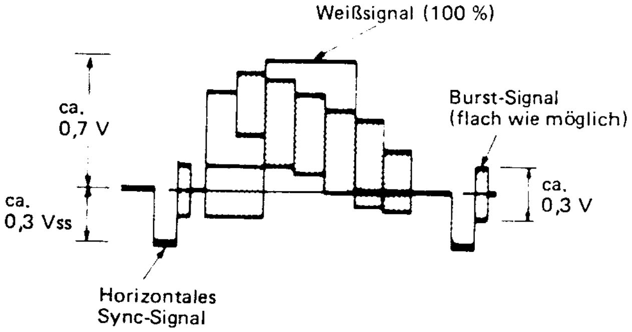
3.1 VORBEREITUNGEN

Elektrische Einstellungen sind erforderlich, wenn Bauteile oder in einigen Fällen auch mechanische Teile ausgetauscht werden.

Abgleich und Einstellarbeiten sollten erst begonnen werden, wenn der Austausch von Teilen oder deren Reparatur beendet ist. Abgleicharbeiten sollten unterbleiben, falls die dafür erforderlichen Meßeinrichtungen nicht verfügbar sind.

3.2 ERFORDERLICHE MESSGERÄTE

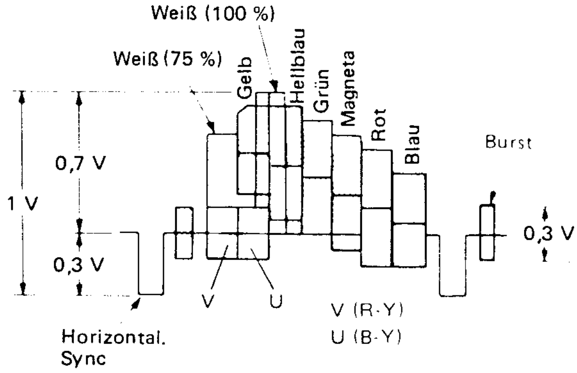
1. Farbmonitor
2. Oszillograf: Zweikanal-Oszillograf mit verzögerter Zeitbasis
3. Frequenzzähler
4. NF-Generator
5. NF-Voltmeter
6. Digital-Voltmeter
7. Signalgenerator: HF/ZF Wobbler mit Markengenerator
8. Signalgenerator: PAL-Farbbalken, Grautreppe


Weißsignal (100 %)
ca. 0,7 V
Burst-Signal (flach wie möglich)
ca. 0,3 V
ca. 0,3 Vss
Horizontales Sync-Signal

Farbbalken des Signalgenerators

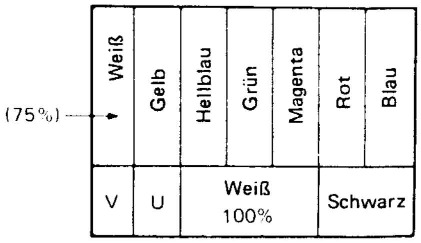
Abb. 3-2-1

9. Abgleichband, MH2
10. Videocassette für Aufnahmen


Weiß (100 %)
Weiß (75 %)
Gelb
Hellblau
Grün
Magneta
Rot
Blau
Burst
0,7 V
1 V
0,3 V
0,3 V
V
U
V (R-Y)
U (B-Y)
Horizontal. Sync

Farbbalkensignalform

Abb. 3-2-2


(75%)
Weiß
Gelb
Hellblau
Grün
Magenta
Rot
Blau
V
U
Weiß 100%
Schwarz

Farbbalkenaufteilung

Abb. 3-2-3

3. 2. 1 Inhalt des Abgleichbandes MH-2

Teil	Spielzeit	Videosignal	Audiosignal	Anwendung
1	10 min.	Graubalken (stairsteps)	6 kHz	• Einstellung der Kompatibilität • Servoeinstellungen • Azimuteinstellungen des Audio-Kopfes
2	5 min.	Rauschen (none)	3 kHz	• Prüfen der Bandgeschwindigkeit • Gleichlauftest
3	10 min.	Farbbalken (color bars)	1 kHz (0 dB)	• Prüfen der Videoschaltung • Prüfen der Audioschaltung
4	3 min.	Wobbelsignal (RF sweep)	(Rauschen)	• Videokopfresonanzeinstellung • Marken 2, 4, 5 MHz

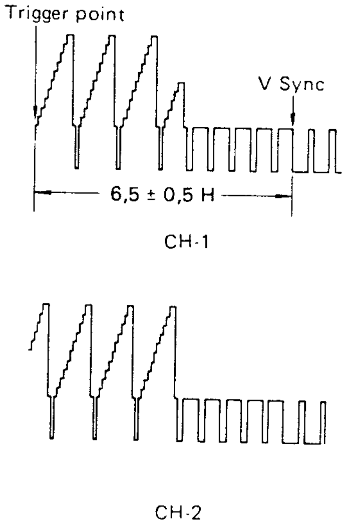
3. 3 NETZTEIL (0 1 Netzplatine)

Nr.	**Punkt**	**Prüfen**	**Einstellen**	**Betriebsart**	**Beschreibung**
1	SWD 5 V	TP1 (SWD 5 V) TP GND	R6 (5 V ADJ)	Aufnahme	1. Zwischen TP1 und Masse ein Digital-Voltmeter anschließen. 2. R6 auf 5,33 ±0,1 V einstellen.

3. 4 TIMER-UHR (3 4 Timer-Platine)

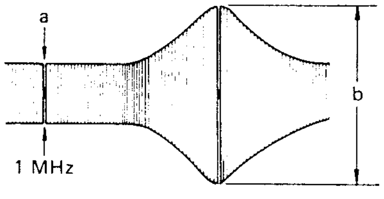
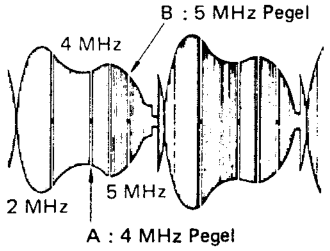
Nr.	**Punkt**	**Prüfen**	**Einstellen**	**Betriebsart**	**Beschreibung**
1	Uhr	TP404	C409	• E-E	1. TP401 und TP402 kurzschließen. (Der Mikroprozessor wird auf Testbetrieb geschaltet.) 2. Beide Enden von C407 (0,47/50) einmal kurzschließen. So wird der Mikroprozessor rückgestellt. 3. Die Periode an TP404 messen. Mit C409 1.000.000 sec ±1,2 microsec. einstellen. **Hinweis:** Nach Rückstellung bei Testbetrieb leuchten alle Anzeigesegmente (mit Ausnahme der beleuchteten Betriebsartsymbole).

3.5 SERVO-SCHALTKREIS (02 Hauptplatine)

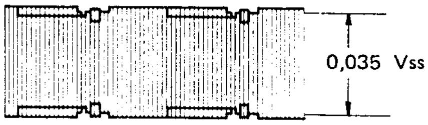
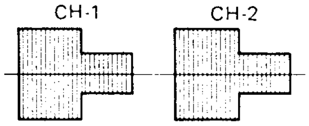
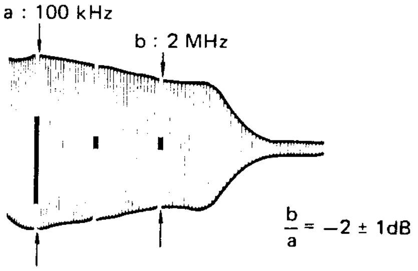
Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
1	Wiedergabe-Umschaltpunkt	TP411 (VIDEO OUT) oder VIDEO OUT	R420 (SW POSITION)	• MH-2 Grautreppe • Wiedergabe	1. An den Videoausgang oder TP411 einen Oszillografen anschließen. 2. Das Abgleichband abspielen (Graubalken). 3. Den Oszillografen extern mit der negativen Flanke des Signals von TP411 triggern. 4. R420 einstellen, um den Triggerpunkt auf 6,5 ±0,5 Zeilen vor dem V-Synchronimpuls einzustellen  Abb. 3-5-1
2	Vertikalpulsposition	• MONITOR • VIDEO OUT	R416 (V. LOCK) R414 (VP. POSI)	• Standbild • Aufnahme, dann Wiedergabe • Farbbalken • SP-Betriebsart	1. Einen Farbbalken aufnehmen und wiedergeben. Auf Standbild schalten. Unter Beachtung des Monitors mit R416 auf minimales vertikales Zittern einstellen. 2. Bei Bildsuchlaufbetrieb R414 so einstellen, daß gilt: $t_2 = 0 \pm 20\,\mu sec$.

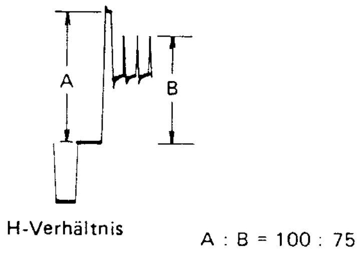
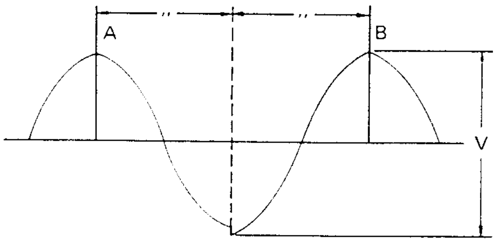
Nr.	Punk*	Prüfen	Einstellen	Betriebsart	Beschreibung
3	Zeitlupeeinstellung	TV-MONITOR	R519 (SLOW TR PRESET)	• Zeitlupe • Mittlere Einrastposition	1. Den SLOW ADJUST RW auf die mittlere Einrastposition einstellen. Aufnehmen und bei Zeitlupe wiedergeben. 2. Unter Beachtung des TV-Monitor-Bilds mit R519 auf optimale Bildqualität bei minimalem Rauschen einstellen.

3. 6 VIDEO-SCHALTKREIS (02 Hauptplatine)

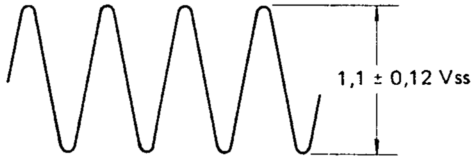
Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
1	Kopfresonanz und Güte Methode A	TP123 (Kanal 1, Aufnahmestrom) TP126 (PB ENV)	C101 (CH-1 fo) R116 (CH-1 Q)	• Wobbelsignal • Wiedergabe	1. Ohne eingelegtes Band auf Wiedergabe schalten. (Siehe "Mechanische Einstellung 2. 3. 1.") 2. Den Oszillografen an TP126 anschließen. 3. Das von einem Video-Wobbelgenerator gelieferte Wobbelsignal an TP123 legen. Dann die Ablenkverstärkung so einstellen, daß die Signalform bei TP126 nicht verzerrt ist. 4. Bei TP126 C101 auf maximalen Pegel bei der 5,0 MHz-Marke einstellen. 5. R116 so einstellen, daß das Verhältnis 5 MHz-Pegel zu 1 MHz-Pegel bei 2,5 : 1 liegt.  $\frac{b}{a} = 2{,}3 - 2{,}5$ Abb. 3-6-1
		TP124 (CH-2 REC CURRENT)	C102 (CH-2 fo) R117 (CH-2 Q)		6. Auf die gleiche Weise C102 und R117 für Kanal 2 einstellen.
	Methode B	 B : 5 MHz Pegel 4 MHz 2 MHz 5 MHz A : 4 MHz Pegel $\frac{B}{A} = 1 - 1{,}1$ Abb. 3-6-2		• MH-2, Wobbelsignal • Wiedergabe	1. Das Wobbelsignal (RF Sweep) von Abgleichband MH-2 abspielen. 2. Den Oszillografen an TP106 anschließen. 3. Den Oszillografen extern mit dem Signal von TP411 triggern. 4. Mit der negativen Flanke für CH-1, mit der positiven Flanke für CH-2 triggern. 5. R116 voll im Gegenuhrzeigersinn, R117 voll im Uhrzeigersinn drehen. Das Signal darf nicht begrenzt werden. 6. Mit C101 den Resonanzpunkt für CH-1 auf 5,0 MHz, mit C102 den Resonanzpunkt für CH-2 gleichfalls auf 5,0 MHz einstellen. 7. R116 so einstellen, daß der 5-MHz-Pegel um 1 dB über dem 4-MHz-Pegel liegt. 8. Auf die gleiche Weise R117 für CH-2 einstellen. 9. Wenn die Pegel von CH-1 und CH-2 differieren, den stärkeren Kanal mit R116 und R117 an den schwächeren anpassen.
2	VXO	IC201, Pin ⑬ (fsc 4,433 MHz)	R210 (VXO 4,433 MHz)	• MH-2, Farbbalken • Wiedergabe oder • TV-Signal (Farbe) • Aufnahme, dann Wiedergabe	1. Einen Frequenzzähler an Pin ⑬ von IC201 anschließen. 2. Das vorbespielte Band oder das Abgleichband abspielen. 3. R210 auf 4,433619 MHz ±50 Hz ein.

– VIDEO –

Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
3	REC FM-Pegel	TP122 (REC FM)	R175 (REC FM ADJ)	• Farbbalken • Aufnahme	1. Ein Farbbalkensignal anlegen. 2. An TP122 einen Oszillografen anschließen. 3. R175 so einstellen, daß der Austastpegel der vertikalen Austastung bei 0,035 Vss liegt.  **Abb. 3-6-3**
4	REC Farbpegel	TP204 (PB COL)	R217 (REC COL ADJ)	• MH-2, Farbbalken • Wiedergabe • Farbbalken • Aufnahme, dann Wiedergabe	1. An TP204 einen Oszillografen anschließen. 2. Den Oszillografen extern mit der negativen Flanke des Signals von TP411 triggern. 3. Den Farbbalken des Abgleichbandes abspielen, dann den Farbpegel (CH-1) messen. Diesen Pegel als "a" merken. 4. Ein Farbbalkensignal anlegen, aufnehmen und wiedergeben. 5. Bei der Aufnahme R217 so einstellen, daß der Farbpegel von CH-1 110 % ±5 % von Pegel "a" beträgt. **Hinweis:** Das Abgleichband, dann ein eigenbespieltes Band abspielen. Sichergehen, daß zwischen den Kanälen keine Farbpegelumkehrung auftritt.  **Abb. 3-6-4**
5	V PULSE-Position	TV-Bildschirm	R432 (V. LOCK)	• Farbbalken • Aufnahme, dann Wiedergabe, dann Standbild	1. Ein Farbbalkensignal anlegen, aufnehmen und wiedergeben. 2. Auf Standbildwiedergabe schalten. 3. Die Bildwiedergabe überprüfen und mit R432 vertikales Zittern minimieren.
6	PB-Frequenzgang Methode A	TP110 (VIDEO OUT)	R188 (RF EQ)	• Farbbalken • Aufnahme, dann Wiedergabe	1. An TP110 einen Oszillografen anschließen. 2. Den Bildschärferegler auf seine Einrastposition (Mitte) einstellen. 3. Ein Video-Wobbelsignal (mit Sync) aufnehmen und wiedergeben. 4. R188 so einstellen, daß der 2-MHz-Pegel bei -2 ±1 dB im Bezug zu 100 kHz liegt.  **Abb. 3-6-5**

Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
	Methode B			• Gittermuster • Aufnahme, dann Wiedergabe	1. Einen Oszillografen an Pin 35 von IC102 anschließen. 2. Gittermuster aufnehmen und wiedergeben. 3. R127 so einstellen, daß der Gittersignalpegel an Pin 35 bei 75 % liegt, wie in Abb. 3-6-6 gezeigt. 4. Sichergehen, daß kein Flimmern und keine Schwarzweißumkehrung im Wiedergabebild auftreten. Falls erforderlich, R116, R117 und R127 vorsichtig nachjustieren.  **Abb. 3-6-6**
7	SECAM DET	TP210 (S DET ADJ)	L308 (1/2 fH TUNING) R337 (S DET ADJ)	• SECAM-Farbbalken • E-E	1. An TP210 einen Oszillografen anschließen. 2. R228 so einstellen, daß die Übergangsstufe im Zentrum zwischen A und B liegt, wie in Abb. 3-6-7 gezeigt.  Diesen Punkt zentral zwischen die Punkte A und B legen. V = mehr als 6,0 Vss bei Aufnahme V = 5 ±0,5 Vss bei Wiedergabe **Abb. 3-6-7**
				• Aufnahme, dann Wiedergabe	3. Aufnehmen, dann wiedergeben. 4. R228 auf 6,0 ±0,5 Vs-s einstellen.

3.7 AUDIO-SCHALTKREIS (0 2 Hauptplatine)

Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
1	Vormagnetisierungspegel	TP31 (BIAS LEVEL) TP32 (GND)	R21 (BIAS LEVEL)	• Aufnahme	1. An TP31 und TP32 (Erde) ein Digital-Voltmeter anschließen. 2. Auf Aufnahme, ohne Signal, schalten. 3. R21 auf 2,4 ±0,2 mV einstellen.
2	Audio-Wiedergabepegel	AUDIO OUT	R5 (PB LEVEL)	• Farbbalkensignal • Audiosignal -20 dBs/1 kHz • Aufnahme, dann Wiedergabe	1. An AUDIO OUT einen Oszillografen anschließen. 2. Ein Video- und ein Audiosignal aufnehmen und wiedergeben. 3. R5 auf -6 dBs ±1 dBs (1,1 ±0,12 Vss) bei AUDIO OUT einstellen.  Abb. 3-7-1

3. 8 TUNER/ZF-SCHALTKREIS (0 4 TU-IF-Platine)

Falls nicht anders angegeben, befinden sich alle Testpunkte und Einstellpunkte auf der TUNER/ZF-Platine.

Erforderliche Geräte

1. Oszillograf
2. ZF-Wobbelsignalgenerator mit Markengeber (Bild-Ton ZF)
3. Gleichspannungsversorgung – Für Betriebsspannung (12,0 V)
   – Für ZF AGC-Vorspannung (ca. 5 V variabel)
4. Anschlußkabel (Wobbelsignal-Kabel) wie unten gezeigt.

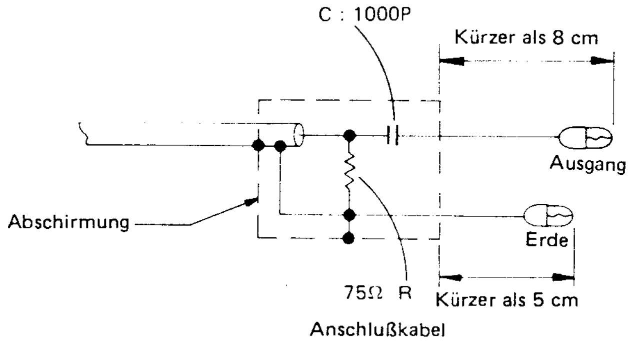
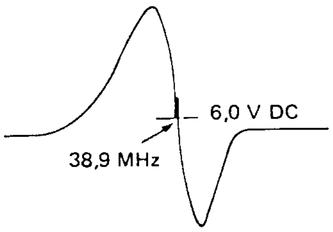
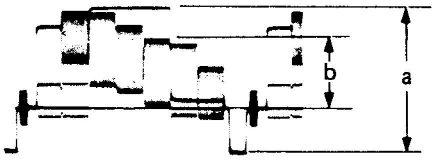


Abb. 3-8-1

Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
1	LLD-Spule	TP12 (V. DET. OUT)	T3 (LLD)	Wobbelgenerator (38,9 MHz) EG/E (39,5 MHz) EK	1. Obiges Anschlußkabel des Wobbelgenerators an Pin 9 von IC1 (M51316BP) anschließen. 2. Den Ausgangspegel so einstellen, daß die Signalform des Oszillografen nicht verzerrt (ca. 25 mVrms). An TP14 (AGC) eine Gleichspannung anlegen. Die AGC-Vorspannung auf 1 Vss für TP12 (V. DET. OUT) einstellen. 3. T3 (LLD-Spule) so einstellen, daß die Video-ZF-Träger-Marke EG = 38,9 MHz, EK = 39,5 MHz im Maximum liegt.
2	Tonfalle	TP12 (V. DET. OUT)	T1 (S. TRAP)	Wobbelgenerator (33,4 MHz) EG/E (33,5 MHz) EK	1. Wie oben bei Punkt 1. den Wobbelgenerator und die Spannungsversorgung anschließen. 2. T1 (S. TRAP) so einstellen, daß die Ton-ZF-Träger-Marke 33,4 MHz im Minimum liegt.
3	ZF-Spule	TP12 (V. DET. OUT)	ZF-Spule (Im Tuner)	Wobbelgenerator (38,15 MHz) EG/E (39,5 MHz) EK	1. Die Ausgangssonde des Wobbelgenerators an die Prüfstelle im Tuner anschließen. 2. Für Austastpegel und Spannungsversorgung gelten die Angaben von 1 (LLD-Spule). 3. Die ZF-Spule (im Tuner) so einstellen, daß die 38, 15-MHz-Marke ihren Maximalpegel erreicht.

Nr.	Punkt	Prüfen	Einstellen	Betriebsart	Beschreibung
4	AFC-Spule	Pin 24 von IC1 (M51316BP)	T2 (AFC-Spule)	Wobbelgenerator (38,9 MHz) EG/E (39,5 MHz) EK	1. Den AFC-Schalter auf ON stellen und den Wobbelgenerator auf 8,5 mVrms einstellen. 2. Den Oszillografen an Pin 24 von IC1 anschließen. 3. Gleichspannung an Pin 3 von IC3 anschließen und 2,2 V Gleichspannung anlegen. 4. Den Ausgangspegel so einstellen, daß die Signalform wie im Oszillografen gezeigt erscheint. Die AGC-Vorspannung so einstellen, daß die Signalform nicht verzerrt. 5. T2 (AFC) so einstellen, daß der Video-ZF-Träger (38,9 MHz) 6,0 V Gleichspannung beträgt, wie in der Abb. gezeigt.  **Abb. 3-8-2**
5	Nachbarkanalfalle (nur EG/E)	TP12 (V. DET. OUT)	T5 (ADJACENT TRAP)	ZF-Wobbelsignal	1. Einen ZF-Wobbelgenerator an den ZF Tunertestpunkt anschließen. 2. An diesen Testpunkt wird das mit 400 Hz modulierte 32,4-MHz-Signal gelegt. 3. T5 so einstellen, daß der Signalpegel bei T12 Minimum ist.
6	AGC	ZF-Testpunkt (am Tuner)	R10 (AGC)	Farbbalken, TV-Signalgenerator	1. Signal empfangen. R10 auf Maximalpegel am ZF-Testpunkt einstellen. Dann R10 nachjustieren, um diesen Pegel um 10 dB zu senken.
7	Farbpegel	TP13 (VIDEO OUT)	R32 (COLOR LEVEL)	Farbbalken, TV-Signalgenerator	1. Farbsignal empfangen. R32 so einstellen, daß der Magentapegel bei TP12 44 % des Y-Signals (inkl. Sync) beträgt.  b : Magenta a : b = 1 : 0,44 **Abb. 3-8-3**
8	Audio-Pegel	TP21 (AUDIO OUT)	R40 (AUDIO LEVEL)	Farbbalken, TV-Signalgenerator	1. Ein Signal mit 1 kHz ±50 Hz DEV-Tonmodulation empfangen. R40 auf −14 dBs Tonausgangspegel bei TP21 (Tonausgang) einstellen. Jedoch bei 1 kHz ±30 Hz DEV-Tonmodulation auf −18 dBs einstellen.